FLORA OF PANAMA

Part IV. Fascicle 4*

CHENOPODIACEAE

BY JAMES A. DUKE

Flowers perfect or unisexual, monoecious, polygamous or dioecious, sessile or shortly pedicellate, often bracteate and bibracteolate, the bracts mostly herbaceous. Perianth uniseriate, of (0–) 2–5 lobes, usually hypogynous, the lobes discrete or basally connate, usually greenish. Corolla absent. Stamens as many as or fewer than the sepals, the filaments mostly discrete, the anthers 2–4-locellate, usually introrse and dorso-medially attached. Ovary superior, unilocular, uniovulate, the ovule erect on a short funicle or pendulous from an elongate funicle; styles 1–3, the stigmata capitate or elongate or the stigmata 2–5 and elongate. Fruit a 1-seeded indehiscent or circumscissile utricle, the perianth often and the sepals occasionally adherent to the seed; seeds erect, horizontal or inverted, lenticular, cochleate, subglobose or ellipsoid; embryos circular or hippocrepiform and more or less encircling the endosperm or spirally coiled and nearly filling the seed. Herbs, rarely shrubs or small trees, with simple alternate or opposite exstipulate leaves, these often farinose or glandular. Flowers glomerulate in axillary or terminal spikes, racemes, panicles or cymes, or rarely solitary and axillary, or embedded in the strobiloid axis of the inflorescence.

Embracing about a hundred genera and more than a thousand species, the chenopods are a rather cosmopolitan family containing many weeds and halophytes in addition to a few vegetables such as the beet, spinach and swiss chard, the first of which is sometimes grown around the Canal Zone. Three weedy species of *Chenopodium* occur in Panama, one probably native, the other two known only as weedy advents on San Jose Island.

1. CHENOPODIUM L.

CHENOPODIUM L. Sp. Pl. 218. 1753.

Morocarpus Adans. Fam. 2:261. 1763.
Anserina Dumort. Fl. Belg. 21. 1827.
Teloxys Moq. in Ann. Sci. Nat. 2^1:289. 1834.

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Agathophytum Moq. loc. cit. 2^1:291. 1834.
Roubieva Moq. loc. cit. 2^1:292. 1834.
Oligandra Less. in Linnaea 9:199. 1834. non *Oligandra* Less. 1832.
Orthosporum T. Ness, Gen. Fl. Germ. Dicot. 1: *pl. 57*. 1835.
Ambrina Spach, Hist. Veg. 5:295. 1836.
Botrydium Spach, loc. cit. 5:298. 1836.
Lipandra Moq. Chenop. Enum. 19. 1840.
Gandriloa Steud. Nom. Bot. 2^1:662. 1840.
Oliganthera Endl. Gen. 1377. 1841.
Oxybasis Kar. & Kir. in Bull. Soc. Nat. Mosc. 1841:738. 1841.
Orthospermum Opiz, Seznam 70. 1852.
Vulvaria Bubani, Fl. Pyren. 1:174. 1897.
Botrys Nieuwl. in Am. Midl. Nat. 3:274. 1914.

Flowers perfect or rarely unisexual, sessile or subsessile, ebracteate. Sepals (3–) 5, hypogynous, free or basally united, herbaceous, subequal, often strongly 1-ribbed and cucullate. Stamens 5 or fewer, occasionally varying in number in different flowers of the same inflorescence, the flattened filaments free or basally connate, the anthers mostly suborbicular, introrse, dorso-medially attached. Ovary subglobose, the stigmata 2 (–5), filiform or subulate, mostly sessile or subsessile. Fruit an indehiscent utricle, ovoid to subglobose, the pericarp membranaceous to carnose, free or adherent to the single seed; seeds mostly cochleate-lenticular, smooth to roughened, vertically or horizontally oriented. Annual or perennial often strong-scented herbs. Leaves alternate, entire to pinnatifid, the lowermost at least usually petiolate, frequently glandular or farinose. Inflorescences of terminal or axillary glomerules, the glomerules variously arranged.

Consisting of about a hundred weedy species, *Chenopodium* is a rather cosmopolitan assemblage of meager economic importance. Various species are used in Central America and elsewhere as potherbs, condiments and vermifuges. Three easily differentiated species are presently known to occur in Panama, but several others occur in Central America north of Panama.

a. Plants farinose, never with oil glands on the leaves and inflorescence; seeds horizontal, dull or lustrous, 1–1.5 mm. broad, the circular embryo completely encircling the endosperm.

  b. Leaf blades rhombic, dentate; sepals merely 1-ribbed; seeds dull, tuberculate, 1.2–1.5 mm. broad, the margins acute; pericarp adherent to the seeds........ 1. C. MURALE

  bb. Leaf blades lance-linear to oblong, entire; sepals carinate; seeds lustrous, smooth, 1–1.2 mm. broad, the margins obtuse; pericarp free of the seeds........ 2. C. PRATERICOLA

aa. Plants glandular, with resinous dots on the leaves and inflorescence; seeds horizontal and vertical, lustrous, 0.6–0.8 mm. broad, the hippocrepiform embryo incompletely encircling the endosperm........ 3. C. AMBROSIOIDES

1. CHENOPODIUM MURALE L. Sp. Pl. 219. 1753.

Atriplex muralis Crantz, Inst. 1:206. 1766.
Chenopodium guineense Jacq. Coll. 2:346. 1788.
Chenopodium carthagenense Zuccagni, in Roem. Coll. 133. 1806.
Chenopodium murale β albescens Moq. Chenopod. Enum. 32. 1840.
Chenopodium murale γ carthagenense Moq. loc. cit. 32. 1840.

Vulvaria trachiosperma Bubani, Fl. Pyren. 1:177. 1897.
Chenopodium murale spissidentatum Murr, in Magyar Bot. Lap. 2:11. 1903.

Erect or ascending annuals to as much as 6 dm. tall, the branches ascending, often deeply sulcate, occasionally farinose, especially toward the extremities. Leaves somewhat lustrous and occasionally bullate above, glabrous to rather densely farinose below, deltoid to rhomb-ovate, marginally irregularly and acutely dentate, apically acuminate to attenuate and often mucronate, basally acute to truncate, 2.5–8 cm. long, 2–5 cm. broad, the petioles mostly 3–70 mm. long, sometimes quite as long as the blades. Flowers irregularly disposed in glomerules, the glomerules sessile along the dichotomously branching rhachises, these axillary and terminal, distally farinose. Sepals 5, subequal, ovate, obtuse, cucullate, 1-ribbed, slightly if at all carinate, farinose, basally connate, 1–1.5 mm. long; stamens 5, caducous, the filaments flattened, the anthers orbicular, exserted; ovary subglobose, the style quite short, the 2 (–3) stigmata ca. twice as long, spreading, irregularly glandular. Utricle partially enclosed by the sepals, the seed lenticular-cochleate, minutely tuberculate, dull reddish-brown, 1.2–1.5 mm. broad, horizontal, the pericarp adherent.

Presumably a native of Europe, Asia and Africa, now widely adventive in America as far north as Canada; in Panama known only as a lawn weed in San Jose Island.

PANAMÁ: main camp, San José Island, Perlas Archipelago, Gulf of Panama, ca. 55 mi. sse. of Balboa, *Johnston 1206*.

2. CHENOPODIUM PRATERICOLA Rydb. in Bull. Torr. Club 39:310. 1912.

Chenopodium petiolare var. *leptophylloides* Murr. in Bull. Herb. Boiss. 2^4:994. 1904.
Chenopodium leptophyllum var. *leptophylloides* Thellung & Aellen, in Fedde, Rep. Spec. Nov. 26:134. 1929.
Chenopodium pratericola var. *leptophylloides* Aellen, in Ostenia 100. 1933.
Chenopodium pratericola ssp. *pratericola* var. *leptophylloides* Aellen, in Am. Midl. Nat. 30: 64. 1943.

Erect or ascending annuals to as much as 3 dm. high, the branches ascending, usually multisulcate, bicolored, bullate or farinose, especially distally. Leaves yellowish-green above, whitish and densely farinose below, narrowly oblong to lanceolate, entire or rarely subhastatulate, apically obtuse to acute and mucronulate, basally acute to attenuate, 10–45 mm. long, 2–10 mm. broad, the petioles 2–10 mm. long. Flowers sessile in dense glomerules, the glomerules in panicled interrupted spikes, the rhachises densely farinose. Sepals 5, subequal, ovate, subacute, cucullate, strongly carinate, farinose, basally connate, ca. 1 mm. long; stamens 5, the flattened filaments included, the anthers orbicular; ovary subglobose, the 2 stigmata sessile or subsessile, spreading, irregularly glandular. Utricle completely embraced by the sepals, the seed lenticular-cochleate, smooth, lustrous, reddish-brown, 1–1.2 mm. broad, horizontal, loosely embraced by the pericarp.

Western United States to Mexico; Argentina; probably adventive on San Jose Island as it is in the eastern United States.

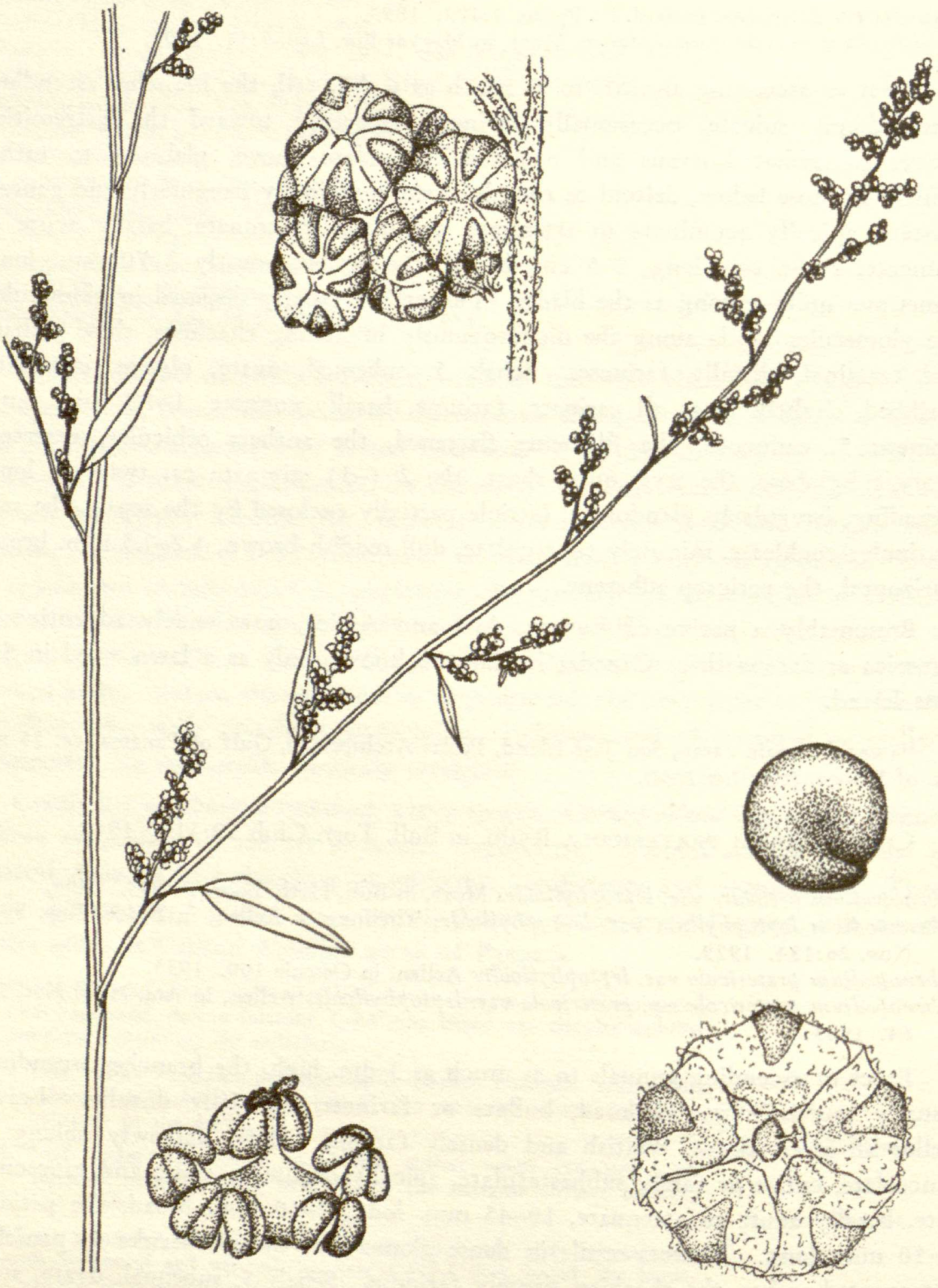

Fig. 110. *Chenopodium pratericola*

PANAMÁ: abandoned corral, San José Island, Perlas Archipelago, Gulf of Panama, ca. 55 mi. sse. of Balboa, *Johnston 1230.*

The occurrence of this species as a weed on San Jose Island would tend to substantiate I. M. Johnston's claim (in Sargentia 8:30. 1949) that the weeds were introduced from Texas in unclean hay. The two related taxa [C. *pratericola* ssp. *pratericola* var. *thellungianum* Aellen, with linear leaves, and C. *pratericola* ssp. *desiccatum* (A. Nelson) Aellen, a semi-prostrate form] were unknown in Texas at the time of Aellen's monograph (in Fedde, Rep. Spec. Nov. 26:119. 1929). It must be noted that Aellen (in Am. Midl. Nat. 30:64. 1943) has reduced C. *dessicatum* to a subspecies of C. *pratericola,* a very peculiar mishap since C. *desiccatum* antedates C. *pratericola* by 10 years and seems not to be homonymous. If they do indeed prove to be mere subspecies of the same species, several new combinations will be required, but I will leave these for the monographer.

3. CHENOPODIUM AMBROSIOIDES L. Sp. Pl. 219. 1753.

Chenopodium anthelminticum L. Sp. Pl. 220. 1753.
Atriplex ambrosioides Crantz, Inst. 1:207. 1766.
Atriplex anthelmintica Crantz, loc. cit. 1:207. 1766.
Chenopodium suffruticosum Willd. Enum. 290. 1809.
Chenopodium spathulatum Sieber, Fl. Martin. 92. 1825.
Chenopodium santa-maria Vell. Fl. Flum. 126. 1825.
Chenopodium chilense Schrad. Ind. Sem. Hort. Gotting. 1832:2. 1832. non Pers. 1805.
Orthosporum ambrosioides Kostel. Allg. Med.-Pharm. Fl. 1433. 1835.
Orthosporum suffruticosum Kostel. loc. cit. 1433. 1835.
Ambrina chilensis Spach, Hist. Veg. 5:297. 1836.
Ambrina ambrosioides Spach, loc. cit. 5:297. 1836.
Ambrina anthelmintica Spach, loc. cit. 5:298. 1836.
Roubieva anthelmintica H. & A. Bot. Beech. Voy. 387. 1840.
Chenopodium retusum Juss. ex Moq. in DC. Prodr. 13^2:73. 1849.
Chenopodium obovatum Moq. loc. cit. 13^2:73. 1849.
Ambrina denudata Phil. in Linnaea 29:37. 1856.
Chenopodium ambrosioides anthelminticum A. Gray, Manual 2:364. 1856.
Ambrina andicola Phil. in Anal. Univ. Sant. 91:442. 1895.
Chenopodium querciforme Murr, in Mag. Bot. Lap. 3:37. 1904.
Blitum ambrosioides G. Beck, in Reichenb. Ic. Fl. Germ. 24:118. 1908.
Botrys ambrosioides Nieuwl. in Am. Midl. Nat. 3:275. 1914.
Botrys anthelmintica Nieuwl. loc. cit. 3:275. 1914.
Chenopodium vagans Standl. in N. Am. Fl. 21:26. 1916.
Also numerous other infraspecific names; see Aellen (in Am. Midl. Nat. 30:51. 1943).

Erect or ascending ill-scented perennials to as much as 15 dm. high, the branches ascending, usually multisulcate, bicolored, often lignescent, glabrous to tomentulose or villose about the inflorescence. Leaves yellowish green, puberulent, villosulous or glabrate, glandular, with amber-colored secretions, lanceolate to rhomb-elliptic, entire to coarsely and irregularly sinuate-dentate or sinuate-pinnatifid, apically acute, basally attenuate, 2–12.5 cm. long, 0.5–5.5 cm. broad. Flowers sessile, usually in dense glomerules, these contiguous or not and paniculately disposed, interspersed with reduced or rather large leaves, the rhachises glandular and villosulous to glabrate. Sepals (3–) 5, subequal, narrowly ovate, cucullate, very slightly carinate if at all, connate for about one third their length, ca. 1 mm. long; stamens (3–) 5, the flattened filaments about as long as the sepals, the anthers orbicular, slightly exserted; ovary subglobose, the sessile or subsessile stigmata spreading, irregularly glandular. Utricle completely embraced by the sepals, the seed lenticular-cochleate, smooth, lustrous, reddish-brown, 0.6–0.8 mm. broad, horizontal and vertical, loosely embraced by the pericarp.

A cosmopolitan weed, perhaps indigenous in Mexico and Central America.

CHIRIQUÍ: Alto Lino, 4200 ft., *Bro. Maurice 882*. PANAMÁ: Juan Díaz, *Standley 30529*.

Polymorphically perplexing, this species, or some of its subspecies, varieties or forms, is quite cosmopolitan. Colloquial names applied to the wormseed in Central America are almost as numerous as the Latin names. In Panama only the name "paico" has been encountered. The plant is used medicinally as a vermifuge, a poultice and reputedly even as a soporific; it is also used as a culinary flavoring.

AMARANTHACEAE

BY JAMES A. DUKE

Flowers perfect or unisexual, monoecious, polygamous or dioecious, mostly pentamerous, usually bracteate and bibracteolate, sessile or short-pedicellate. Calyx uniseriate or biseriate, commonly hypogynous; sepals (2–) 5, discrete or partially connate, scariose, whitish or variously colored. Corolla absent. Stamens (2–) 5, rarely more, hypogynous or perigynous, the filaments discrete or flattened and united below into a tube, the tube often with filamentous pseudostaminodia inserted between the filaments; anthers 2- to 4-locellate, usually introrse and dorso-medially attached. Ovary superior, unilocular, uniovulate (multiovulate in *Pleuropetalum*, *Celosia* and allied genera); ovules campylotropous on mostly elongate flattened funicles; styles 1–8; stigmata capitate or filiform. Fruit a 1-seeded utricle or rarely a several-seeded capsule, often circumscissile; seeds usually cochleate-orbiculate, the embryo excentric in a mealy endosperm. Herbs, shrubs, small trees or clambering vines with alternate or opposite mostly entire exstipulate leaves. Inflorescences of solitary flowers, spikes, glomes, glomerules, or thyrses simply, racemosely or corymbosely disposed.

This largely tropical and subtropical family, of some 50 genera and 500 species, is represented in Panama by eleven of the twelve genera thus far reported for Central America. The twelfth genus, represented in Central America by *Froelichia interrupta*, has not yet been reported between Guatemala and Colombia. Many of the Panama species are cultivants or anthropochorous weeds of disturbed habitats. Several species in several genera are employed as potherbs and species of *Amaranthus* are a source of grain. Species of *Iresine, Celosia, Amaranthus* and *Gomphrena* are planted as ornamentals in Central America and other places.

a. Leaves alternate; fruit a many-seeded capsule or a 1-seeded utricle; stigmata 2–8; anthers 4-locellate.

b. Fruit a many-seeded capsule; stamens united below for nearly half their length; stigmata 2–8, usually exceeding the calyx.

c. Capsules exceeding the usually deflexed sepals; seeds more than 10; stigmata 2–8, as long as or longer than the sulcate style; inflorescence paniculate or corymbose; leaves usually ovate; woodland plants........ 1. PLEUROPETALUM

cc. Capsules included by the erect sepals; seeds less than 10, stigmata 2–3, much shorter than the terete style; inflorescences of mostly simple spikes (very complex fasciated inflorescences in cultivants); leaves mostly lanceolate; cultivants or escapes (in Panama)........ 2. CELOSIA

bb. Fruit a 1-seeded utricle; stamens discrete or united below for less than a third of their length; stigmata 2–3, exserted or included.

d. Flowers monoecious or polygamo-monoecious (in Panama spp.); filaments discrete; seeds exarillate, reddish brown, less than 1.5 mm. broad; erect or ascending herbs........ 3. AMARANTHUS

dd. Flowers perfect; filaments basally connate; seeds arillate, black, 1.5–2.5 mm. broad; clambering suffruticose herbs or shrubs........ 4. CHAMISSOA

aa. Leaves opposite; fruit a 1-seeded indehiscent utricle; stigmata 1–3; anthers 2- to 4-locellate.

e. Inflorescences of elongate spikes, the constituent flowers or glomerules deflexed in fruit; bracts and bracteoles strongly spinescent; anthers 4-locellate; style 1, with a capitate stigma.

f. Flowers not glomerulate, perfect; spines straight or slightly arcuate; seeds 0.8–1.2 mm. broad, reddish brown; sepals glabrate or minutely tomentose, without protrusive ribs........ 5. ACHYRANTHES

ff. Flowers glomerulate, some sterile and highly modified; spines uncinate; seeds 1–2.5 mm. broad, succineous; sepals pilose, with strongly protrusive ribs........ 6. CYATHULA

ee. Inflorescences of panicles, racemes, glomerules or short congested spikes, the constituent flowers not strongly deflexed in fruit; bracts rarely spinescent (*Alternanthera* spp.); anthers 2-locellate; styles 1–3, the stigmata filiform, cylindric or capitate.

g. Inflorescences of spikes in much branched panicles (in Panama); flowers perfect, polygamous or dioecious, often with an obvious tuft of hairs arising between the bracts and sepals; stigmata 1–3, if 1, bilabiate; erect herbs, shrubs, trees or clambering vines.

h. Flowers perfect; stigma 1, bilabiate; outer 3 sepals much broader than the inner, with the basal hairs borne mostly inside the outer sepals; clambering suffruticose perennials........ 7. PFAFFIA

hh. Flowers perfect or dioecious; stigmata 2–3, filiform to deltoid; sepals subequal, the basal hairs arising mostly outside the sepals; erect herbs or shrubs (in Panama)........ 8. IRESINE

gg. Inflorescences of spikes or glomes, these solitary or in trichotomously few-branched corymbs; flowers perfect; tufts of intrafloral hairs not obvious to the naked eye; stigmata 1–2, if 1, capitate; procumbent or erect herbs (*Alternanthera* spp. may be shrubby clamberers).

i. Leaf bases amplexicaul, with a tuft of short hairs around the cupuliform node; stigmata 2; pseudostaminodia absent, the filament tube short or absent; flowers short-pedicellate within the bracteoles........ 9. PHILOXERUS

ii. Leaf bases not amplexicaul, thus not forming a cup with a tuft of hairs around the node; pseudostaminodia well-developed (in Panama), the filament tube obvious; flowers sessile within the bracteoles.

j. Stigma 1, capitate to short-cylindric; anthers with an obvious filament inserted between the lacerate or dentate pseudostaminodia; bracteoles shorter than the sepals, not conspicuously cristate (in Panama)........ 10. ALTERNANTHERA

jj. Stigmata 2, filiform; anthers sessile at the summit of the filament tube between bilobate pseudostaminodia; bracteoles equaling or exceeding the sepals, cristate........ 11. GOMPHRENA

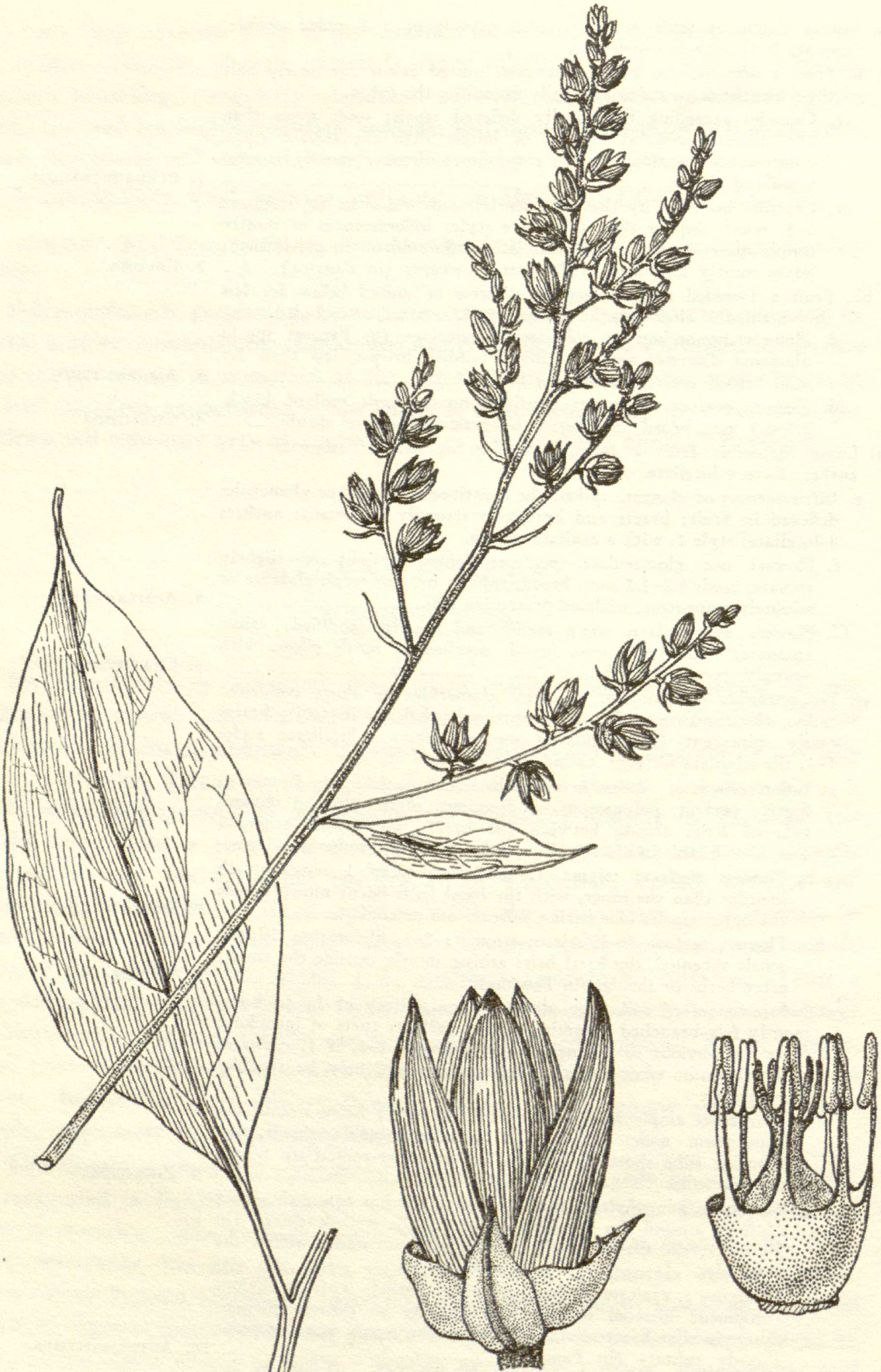

Fig. 111. *Pleuropetalum pleiogynum*

1. PLEUROPETALUM Hook. f.

PLEUROPETALUM Hook. f. in Proc. Linn. Soc. 1:278, and in Lond. Jour. Bot. 5: 108. 1846.

Allochlamys Moq. in DC. Prodr. 13^2:463. 1849.
Melanocarpum Hook. f. in Benth. & Hook. Gen. 3:24. 1880.

Flowers perfect, subsessile to pedicellate, unibracteate and bibracteolate. Sepals 5, discrete, hypogynous, concave, subequal, many-ribbed. Petals absent. Stamens 5–8, hypogynous, connate about half their length forming an exappendiculate tube shorter than the ovary; filaments flattened; anthers 4-locellate, introrse, medially attached. Ovary subglobose, 1-locular, multi-ovulate; ovules campylotropous; funicles flattened or filiform, exarillate, with free central placentation; style 1; stigmata mostly 3–6, at anthesis scarcely distinguishable, ultimately reflexed. Fruits at first baccate, later developing into circumscissile or irregularly dehiscent capsules; seeds cochleate-orbiculate, black, lustrous, reticulate. Glabrate sparingly branched erect suffruticose herbs or shrubs. Leaves alternate, entire, petiolate, lanceolate to rhombic-ovate, glabrous to minutely strigillose, deciduous. Inflorescences of terminal and axillary racemes, panicles or corymbs, with or without foliar leaves.

Inhabiting moist forests of low elevations, this genus, of perhaps three species, ranges from Jalisco to Peru and the Galapagos Islands. The type species, *P. darwinii* Hook. f., endemic to the Galapagos Islands, was reluctantly assigned to the Portulacaceae by Bentham & Hooker (Gen. 1:157. 1862.). The two other species of this economically unimportant genus are both found in Panama.

a. Inflorescence corymbose; sepals with 7–17 ribs; stigmata mostly 3–4; capsule irregularly dehiscent; seeds 1.5–2.2 mm. broad.......... 1. P. SPRUCEI

aa. Inflorescence racemose or paniculate; sepals with 19–27 ribs; stigmata mostly 5–7; capsule circumscissile; seeds 1–1.5 mm. broad.......... 2. P. PLEIOGYNUM

1. PLEUROPETALUM SPRUCEI (Hook. f.) Standl. in N. Am. Fl. 21:96. 1917.

Melanocarpum sprucei Hook. f. in Benth. & Hook. Gen. 3:24. 1880.
Pleuropetalum costaricense Hort. Kew, ex Hemsl. Biol. Centr. Am. Bot. 3:12. 1882.
Pleuropetalum tucurriquense Donn. Smith, in Bot. Gaz. 61:387. 1916.
Pleuropetalum calospermum Standl. in Jour. Wash. Acad. Sci. 13:368. 1923.

Erect sparingly branched subglabrous suffruticose herbs or shrubs to 3 m. high. Leaves glabrous to minutely strigillose on the veins below, broadly lanceolate to rhombic-ovate, often falcate, apically attenuate, basally acute to subrounded, 3–15 cm. long, 1–6 cm. broad; petioles 5–20 mm. long. Inflorescences of mostly terminal corymbose racemes, the rhachises usually glandular. Flowers perfect, on pedicels 1–10 mm. long; bracts and bracteoles subequal, ovate to orbicular, carinate, 0.5–1 mm. long; sepals 5, subequal, ovate, concave, glabrate or scurfy, rounded to subacute, ultimately spreading, 2–4 mm. long, 1–2 mm. broad, with 7–13 (–17) ribs; stamens 5–8; filaments 2–3 mm. long; filament tube 1–2 mm. long; anthers oblong; ovary globose; style 1, about 0.5 mm. long; stigmata mostly 3–4, longer than the style, ultimately reflexed. Fruit an irregularly dehiscent capsule exceeding the sepals, 4–7 mm. long, 3–6 mm. broad; seeds cochleate-orbiculate, black, lustrous, reticulate, 1.5–2.2 mm. long, on filiform or flattened funicles becoming 1–3 mm. long.

BOCAS DEL TORO: vicinity of Chiriquí Lagoon, *von Wedel 1028*. CHIRIQUÍ: Bajo Mono, Boquete District, 4500 ft., *Davidson 481*; R. Chiriquí Viejo Valley, on island near River, *White 150*; valley of the upper Río Chiriquí Viejo, 1300–1900 m., *White & White 12*.

This woodland species ranges from Jalisco to Peru. The Jalisco specimen (*Mexia 1899*) is atypical in having a circumscissile capsule, in that respect resembling the Galapagos species *P. darwinii* Hook. f. Standley (in Jour. Wash. Acad. 13:368. 1923.) describes *P. calospermum* from Salvador, and ascribes to it larger seeds, sepals and capsules than occur in *P. sprucei*. The larger seed size is not always correlated with the larger sepals. Variations in sepal and capsule size are frequently great enough in single specimens to embrace the descriptions of both species, so they are here concluded to be conspecific.

2. PLEUROPETALUM PLEIOGYNUM (O. Ktze.) Standl. in Jour. Wash. Acad. 13: 369. 1923.

Celosia pleiogyna O. Ktze. Rev. Gen. 541. 1891.
Pleuropetalum standleyi Suessenguth, in Rep. Spec. Nov. 44:41. 1938.

Erect sparingly branched subglabrous suffruticose herbs or shrubs to 3 m. high. Leaves glabrous to minutely strigillose on the veins below, lanceolate to rhombic-ovate, often falcate, apically attenuate, basally acute to subrounded, 3–15 cm. long, 1–5 cm. broad; petioles 5–25 mm. long. Inflorescences of mostly terminal racemes or panicles, the rhachises usually glandular. Flowers perfect, on pedicels 1–5 mm. long; bracts and bracteoles subequal, broadly ovate, carinate, 0.5–2 mm. long; sepals 5 (–6), subequal, ovate, concave, glabrate or scurfy, rounded to acute, with 19–27 ribs, 2.5–6 mm. long, 1–4 mm. broad; stamens 6–8; filaments 2–3 mm. long; filament tube 1–2 mm. long; anthers oblong; ovary globose to ellipsoid; styles 1, sulcate, about 0.5 mm. long; stigmata 5–6, rarely more or less, usually longer than the style, ultimately reflexed. Fruit a circumscissile capsule equaling or exceeding the sepals, red becoming black, 5–7 mm. long, 4–7 mm. broad; seeds cochleate-orbiculate, black, lustrous, reticulate, 1–1.2 (–1.5) mm. broad, on filiform or flattened funicles becoming 1–3 mm. long.

CANAL ZONE: vicinity of Las Cruces, 26–40 m., *Seibert 578*; drowned forest of Quebrada Culebra, *Dodge & Allen 17051*; forests along the banks of Quebrada Fea, Q. Pura and Cañon of R. Chagres, *Dodge & Allen 17405*; drowned forest of Quebrada Bonita and along its branches, 70–80 m., *Steyermark & Allen s. n.*; drowned forest of Quebrada Ancha, 70 m., *Steyermark & Allen s. n.* CHIRIQUÍ: Galera Chorcha, vicinity of Gualaca, alt. 1000 ft., *Allen 5054*. DARIÉN: Río Sabana, *Leopold 196*; Cana and vicinity, *Williams 727*. PANAMÁ: Cerro Campana, alt. 800 m., *Allen 4024*.

This species is apparently confined to Costa Rica, the type locality, and Panama. It occurs in rather deep woods, especially along streams in ravines and drowned forests.

2. CELOSIA L.

Celosia L. Sp. Pl. 205. 1753.

Amaranthus Adans. Fam. Pl. 2:269. 1763. not L. 1753.
Sukana Adans. loc. cit. 269. 1763.
Lestibudesia Thouars, Hist. Vég. Illes Afr. 53. 1806.
Lophoxera Raf. Fl. Tell. 3:42. 1837.
Gonufas Raf. Sylva Tell. 124. 1838.

Flowers perfect, the uppermost occasionally sterile, subsessile or short pedicellate, unibracteate and bibracteolate. Sepals 5, discrete, hypogynous, concave, variously colored, not strongly ribbed. Petals absent. Stamens 5, hypogynous, connate less than half their length forming an appendiculate or exappendiculate tube shorter than the ovary; filaments flattened; anthers 4-locellate, introrse, medially attached. Ovary subglobose to ellipsoid, 1-locular, multi-ovulate; ovules campylotropous; funicles flattened, exarillate, with free central placentation; styles 1; stigmata 2–3. Fruit a 2- to many-seeded circumscissile capsule; seeds cochleate-orbiculate, dark reddish brown to black, reticulate. Glabrate or pubescent herbaceous of suffruticose perennials or annuals. Leaves alternate, entire, subsessile to petiolate, glabrous or pubescent, lanceolate to rhombic-elliptic, deciduous. Inflorescences of terminal and axillary panicles or spikes, with or without foliar leaves.

A large genus of some fifty species, this seems to have reached its best development in subtropical regions of America, Africa and Asia. Only one species, the cultivated cockscomb, is so far reported from Panama.

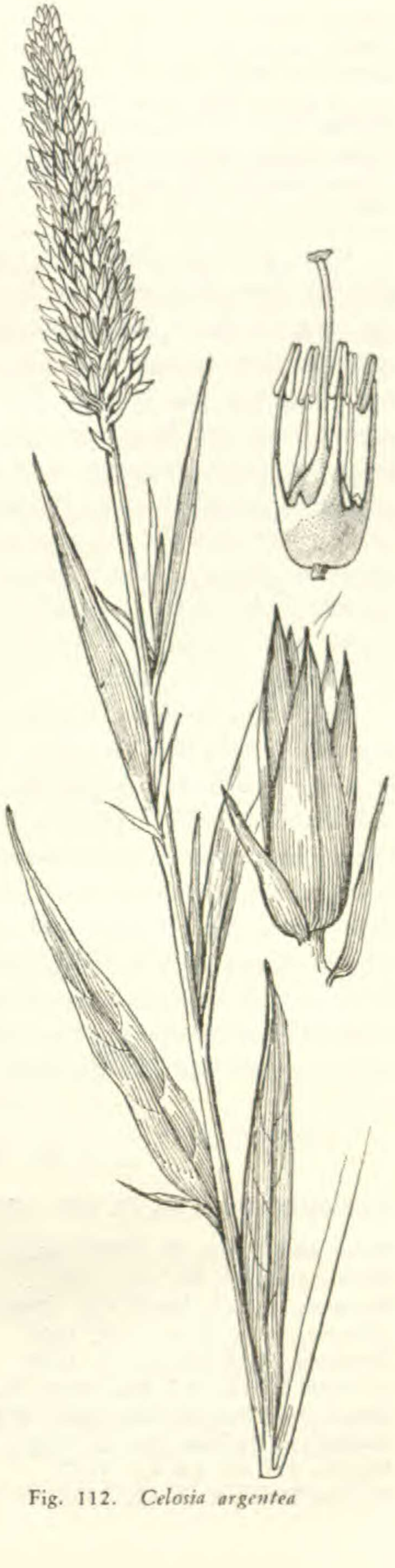

Fig. 112. *Celosia argentea*

1. CELOSIA ARGENTEA L. Sp. Pl. 205. 1753.

Celosia cristata L. loc. cit. 205. 1753.
Celosia margaritacea L. Sp. Pl. ed. 2:297. 1763.
Celosia coccinea L. loc. cit. 297. 1763.
Celosia pyramidalis Burm. Fl. Ind. 65. 1768.
Celosia marilandica Retz. Obs. Bot. 3:27. 1783.
Celosia pallida Salisb. Prodr. 145. 1796.
Celosia huttonii Mast. in Gard. Chron. 215. 1872.
Amaranthus purpureus Nieuwl. in Amer. Midl. Nat. 3:279. 1914.

Erect glabrous simple or much branched annuals to 1 m. high. Leaves glabrous, linear-lanceolate to rhombic or ovate, apically acuminate to acute, 3–12 cm. long, 0.5–6 cm. broad; petioles 1–30 mm. long. Inflorescence of simple (quite complex, often fasciated, in cultivated varieties) pedunculate cylindric spikes 2–20 cm. long, 1–2 cm. broad. Flowers perfect, the uppermost occasionally sterile, sessile; bracts and bracteoles subequal, ovate, mucronate, 2–7 mm. long; sepals 5, subequal, ovate, concave, mucronate, white to pinkish (variously colored in cultivated varieties), erect in fruit, 6–10 mm. long; stamens 5, 3–5 mm. long, the tube shorter than the free portions of the filaments; pseudostaminodia minute and deltoid or absent; anthers oblong; ovary ellipsoid; style 1, 3–6 mm. long, usually exceeding the sepals; stigmata 2 (–3), minute. Fruit a circumscissile capsule, shorter than the calyx, 3–4 mm. long; seeds (1–) 3–6 (–9), cochleate-orbiculate, dark reddish brown, about 1.5 mm. broad.

Cultivated in many regions, possibly natives of Africa, the cockscombs are reported by Standley (in Contr. U. S. Nat. Herb. 27:172. 1928) to be cultivated in gardens in Panama, where they are called *abanico.* The cultivants often escape and morphologically approach the natural variety. Backer (in Fl. Mal. 4^2:74. 1949.) notes that in some escapes, one branch may bear the mark of cultivation with another resembling the wild form. He informs us that the seeds are used by the Chinese for poultices and for adorning cakes, while the leaves furnish an inferior vegetable. In India, where it is used medicinally and as a vegetable, it often appears spontaneously in paddy and ragi fields. Among vernacular names reported from Mexico and Central America are *moño, san josé, cresta de gallo, amor seco, mano de león, flor de mano, amaranto* and *boria.*

3. AMARANTHUS L.

AMARANTHUS L. Sp. Pl. 989. 1753.

Bliton Adans. Fam. Pl. 2:506. 1763.
Bajan Adans. loc. cit. 506. 1763.
Roemeria Moench, Meth. 341. 1794.
Glomeraria Cav. Descr. 319. 1803.
Dimeiandra Raf. Neogen. 2. 1825.
Scleropus Schrad. Ind. Sem. Hort. Gott. 1835.; in Linnaea 11: Litt.-ber. 89. 1837.
Dimeianthus Raf. Fl. Tell. 3:41. 1837.
Amblogyna Raf. loc. cit. 42. 1837.
Euxolus Raf. loc. cit. 42. 1837.
Pentrius Raf. loc. cit. 42. 1837.

Albersia Kunth, Fl. Berol. ed. 2. 144. 1838.
Mengea Schauer, in Meyer, Nov. Acta Acad. Leop. 19: Supply. 1:405. 1843.
Pyxidium Moq. in DC. Prodr. 13^2:262. 1849.
Sarratia Moq. loc. cit. 262. 1849.
Galliaria Bubani, Fl. Pyren. 1:184. 1897.

Flowers monoecious, dioecious or polygamous, sessile or subsessile, unibracteate and bibracteolate. Sepals 3–5, rarely 1, discrete, hypogynous, concave, occasionally basally clawed, equal or subequal, membranaceous, erect and persistent in fruit. Stamens 3–5, rarely 1, hypogynous, discrete; filaments filiform; anthers 4-locellate, introrse, medially attached, oblong. Ovary ovoid to lenticular, 1-locular, 1-ovulate, the ovule campylotropous on a short exarillate funicle, the placentation basal; styles 1–3; stigmata 2–3, usually exceeding the styles. Fruit a utricle, indehiscent or circumscissile; seeds cochleate-orbiculate, smooth to minutely verrucose. Leaves alternate, entire to minutely crenulate, long-petiolate. Erect or prostrate, glabrous to pubescent annual herbs. Inflorescences of terminal and/or axillary spicate or paniculate thyrses, in Panama monoecious or polygamous with female flowers basally, hermaphroditic flowers medially, and male flowers distally, the latter tending to have longer, narrower sepals.

Widespread in both temperate and tropical regions throughout the world, *Amaranthus* consists of perhaps fifty species. Many of them are inhabitants of open disturbed areas where they may become rather annoying weeds. Some are cultivated for their edible seeds and leaves, and others, with brightly colored inflorescences, are planted as ornamentals. Sauer (Ann. Missouri Bot. Gard. 37: 561–632. 1950) reports on the detailed ethnological history of the grain-amaranths. Seven species have been reported in Panama, but one, adventive on San Jose Island, apparently no longer persists.

a. Stamens and sepals 1–3, the sepals mostly less than 1.5 mm. long; utricle rugulose.
b. Inflorescences terminal and axillary; sepals of the pistillate flowers 3, the bracts about equaling them in length; stamens 3.............................. 1. A. VIRIDIS
bb. Inflorescences all axillary; sepals of the pistillate flowers mostly 1–2, about half as long as the bracts; stamens mostly 2................................ 2. A. CALIFORNICUS
aa. Stamens and sepals 5, the sepals mostly more than 1.5 mm. long; utricle smooth or rugulose.
c. Utricle subglobose; stylopodium circular in cross section; sepals red or purple; plants unarmed.. 3. A. CRUENTUS
cc. Utricle compressed-ovoid; stylopodium 2–3-lobulate in cross section; sepals greenish; plants armed or unarmed.
d. Plants unarmed; axillary inflorescences cylindric.
e. Thyrses less than 6 mm. broad; bracts of the pistillate flowers mostly shorter than the sepals, some of the sepals spatulate........... 4. A. DUBIUS
ee. Thyrses more than 6 mm. broad; bracts of the pistillate flowers mostly longer than the sepals, giving the spikes a bristly appearance; none of the bracts spatulate.. 5. A. HYBRIDUS
dd. Plants armed; axillary inflorescences globose.. 6. A. SPINOSUS

In addition to the aforementioned, Johnston (in Sargentia 8:124. 1949) adds that *A. retroflexus* L. was collected on San Jose Island in 1945 (*Erlanson 188*), but was unsuccessfully searched for in 1946. I have not seen the specimen. The species is separated from the closely allied species *A. hybridus* by the obtuse sepals of the pistillate flowers.

1. Amaranthus viridis L. Sp. Pl. 2:1405. 1763.

Chenopodium caudatum Jacq. Coll. 2:325. 1788.
Amaranthus gracilis Desf. Tabl. Bot. 43. 1804.
Albersia gracilis Webb. & Berth. Phyt. Canar. 3:287. 1836.
Euxolus caudatus Moq. in DC. Prodr. 13^2:274. 1849.
Euxolus caudatus β gracilis Moq. loc. cit. 13^2:274. 1849.
Euxolus caudatus γ maximus Moq. loc. cit. 13^2:274. 1849.

Rather delicate glabrous annuals to as much as 1 m. high, the branches ascending. Leaves glabrous; entire to minutely crenulate, deltoid- to rhombic-ovate, apically emarginate to rounded and mucronate, basally truncate to subacute, 1.5–6 cm. long, 1–4 cm. broad, the petioles 0.5–4 cm. long. Inflorescences of thyrses racemosely disposed, the terminal and axillary thyrses cylindric, mostly less than 7 mm. broad. Flowers polygamo-monoecious or monoecious; bracts and bracteoles subequal, lanceolate to ovate, ca. 1 mm. long; sepals 3, linear-oblong to obovate, rounded, mucronate, 1–1.5 mm. long, the midrib dark green, the margins scariose; stamens 3, discrete, 1–1.5 mm. long; ovary compressed-globose; style 1, minute, stigmata 3, longer than the style. Fruit an indehiscent, strongly rugose utricle, 1–1.5 mm. long, 1–1.5 broad; seeds cochleate-orbiculate, dark red to black, dull, minutely pebbled, 1–1.2 mm. broad.

Presumably a native of the Old World tropics, this weedy species is adventive around Balboa (fide Standley, in Contr. U. S. Nat. Herb. 27:173. 1928). It is also adventive in the eastern United States. The names *bledo* and *calalú* are applied to all the species of Panamanian *Amaranthus*, any of which may serve as potherbs.

2. Amaranthus californicus (Moq.) S. Wats. Bot. Calif. 2:42. 1880.

Mengea californica Moq. in DC. Prodr. 13^2:270. 1849.
Amaranthus carneus Greene, in Pittonia 2:105. 1890.
Amaranthus albomarginatus Uline & Bray, in Bot. Gaz. 19:318. 1894.

Prostrate, radially spreading delicate annuals, the branches to as much as 5 dm. long, often tinged with anthocyanins. Leaves glabrous, bullate, entire, often white-margined, ovate to obovate and spatulate, apically emarginate to rounded and mucronate, basally attenuate, 3–25 mm. long, 2–12 mm. broad, the petioles 3–25 mm. long. Flowers in axillary, often leafy, few-flowered clusters, with every node often bearing an inflorescence, these ultimately shorter than the petioles. Flowers monoecious; bracts and bracteoles lanceolate, apically aristate, 1.5–2.5 mm. long; sepals 3 and quite unequal, or 1–2 in the pistillate flowers, linear to lanceolate, acute to obtuse, 0.4–1.0 mm. long; sepals of the staminate flowers 3, subequal; stamens 2, discrete, ca. 1 mm. long; ovary ellipsoid, the stigmata 3, ca. as long as the ovary at anthesis. Fruit a utricle, circumscissile about the middle, rugose, 1–1.5 mm. long, 1–1.5 mm. broad; seeds cochleate-orbiculate, dark reddish-brown, lustrous, minutely pebbled, 0.8–1.1 mm. broad.

PANAMÁ: abandoned corral, San José Island, Perlas Archipelago, Gulf of Panama, ca. 55 mi. sse. of Balboa, *Johnston 1151*.

Although the cited specimen was labeled as *A. albus* L., the prostrate habit, few stamens, and reduced sepals in the pistillate flowers clearly separate it from that species. The small seeds and rugulose utricles also serve to separate it from *A. blitoides* S. Wats., a very closely related prostrate species.

3. **AMARANTHUS CRUENTUS** L. Syst. Veg. 10:1269. 1759.

Amaranthus paniculatus L. Sp. Pl. 2:1406. 1763.
Amaranthus flavus L. loc. cit. 2:1406. 1763.
Amaranthus sanguineus L. loc. cit. 1407. 1763.
Amaranthus parisiensis Schkuhr, Handb. 3:249. 1808.
Amaranthus speciosus Sims, Bot. Mag. *pl. 2227*. 1821.
Amaranthus paniculatus α purpurascens Moq. in DC. Prodr. 13^2:257. 1849.
Amaranthus paniculatus β cruentus Moq. loc. cit. 257. 1849.
Amaranthus hybridus paniculatus Uline & Bray, in Mem. Torr. Club 5:145. 1894.
Amaranthus dussii Sprenger, in Bull. Soc. Tosc. Ort. 3^1:178. 1896.
Galliaria patula Bubani, Fl. Pyren. 1:187. 1897.
Amaranthus hybridus subsp. *cruentus* Thellung, Fl. Adv. Montp. 205. 1912.

Coarse usually pubescent annuals to 2 m. high, simple or with ascending branches. Leaves glabrous above, pubescent or glabrate below, entire to minutely crenulate, ovate to rhombic, apically rounded to acute and mucronate, basally acute to cuneate, 3–15 cm. long, 1–6 cm. broad; petioles 1–8 cm. long. Inflorescences of thyrses racemosely disposed, the terminal and axillary thyrses cylindric, often drooping, 5–15 mm. broad. Flowers polygamo-monoecious or monoecious; bracts and bracteoles subequal, lanceolate to ovate, 1.5–2.5 mm. long; sepals 5, oblong to ovate, rounded to mucronate apically, 1.5–2 mm. long, the midribs dark green, the margins scariose and tinted with anthocyanins; stamens 5, discrete, 1–2 mm. long; ovary compressed globose, capped by a circular stylopodium; stigmata 3 (–4), longer than the stylopodium. Fruit a smooth to rugulose subglobose utricle, circumscissile near the middle, about 2 mm. long, usually exceeding the sepals; seeds cochleate-orbiculate, dark reddish brown to black, minutely reticulate, 1–1.3 mm. broad.

This is the commonly cultivated grain amaranth of Central America. In Panama it is called *abanico chino* and *calalú*, and it is cultivated both as an ornamental and as a potherb. In Mexico and Guatemala the seeds are used in making sweetbreads and mushes. Standley & Steyermark (in Field Mus. Bot. 24^4:153. 1946) point out that *A. caudatus* L., *A. leucosperma* Wats. and *A. cruentus* L. are best treated as one species "rather doubtfully distinct from *A. hybridus*." Sauer (Ann. Missouri Bot. Gard. 37:561–632. 1950) on the other hand contends that there are four major grain amaranth species in the Americas, *A. leucocarpus* Wats., chiefly in Mexico; *A. cruentus* L., chiefly in Guatemala; *A. caudatus* L., chiefly in the Andes; and *A. edulis* Spegazzini, chiefly in Argentina. Of the cultivated amaranths, whether they comprise several or one species, he cites only *A. cruentus* from Panama.

4. AMARANTHUS DUBIUS Mart. Pl. Hort. Erlang. 197. 1814.

Amaranthus tristis Willd. Hist. Amaranth. 21. 1790. not *A. tristis* L.
Amaranthus incomptus Willd. Enum. Hort. Berol. suppl.: 64. 1813. hyponymn.
Amaranthus tristis β *xanthostachys* Moq. in DC. Prodr. 13^2:260. 1849.
Amaranthus tristis γ *flexuosus* Moq. loc. cit. 260. 1849.
Amaranthus tristis δ *leptostachys* Moq. loc. cit. 260. 1849.
Amaranthus dubius B *xanthostachys* Thellung, in Asch. & Graebn. Syn. Mittel-Eur. Fl. 5: 266. 1914.
Amaranthus dubius C *flexuosus* Thellung, loc. cit. 266. 1914.
Amaranthus dubius D *leptostachys* Thellung, loc. cit. 266. 1914.

Rather delicate mostly glabrous annuals to 1 m. high with ascending branches. Leaves glabrous or glabrate, entire or minutely crenulate, deltoid- to rhombic-ovate, apically rounded to acute, often mucronate, basally rounded to acute, 2–8 cm. long, 1–6 cm. broad; petioles 1–6 cm. long. Inflorescences of thyrses racemosely disposed, the terminal and axillary thyrses mostly cylindric and less than 6 mm. broad. Flowers polygamo-monoecious or monoecious; bracts and bracteoles subequal, lanceolate to ovate or obovate, acute to acuminate, 1.5–2 mm. long, the midribs dark green, the margins scariose; stamens discrete, 1–3 mm. long; ovary ovoid; styles (2–) 3, fimbrillate. Fruit a slightly rugose compressed ovoid utricle, circumscissile about the middle, 1.5–2.5 mm. long; seeds cochleate-orbiculate, reddish brown to black, reticulate, 0.8–1.1 mm. broad.

BOCAS DEL TORO: Isla Colón, vicinity of Chiriquí Lagoon, *von Wedel 2854*. CANAL ZONE: near Gorgas Memorial Laboratory, vicinity of Miraflores, *G. White 119*; in government forest along Las Cruces Trail, *Hunter & Allen 712*; Bohio Soldado, *Cowell 235*. DARIÉN: vicinity of Boca de Cupe, ca. 40 m., *Allen 874*. PANAMÁ: Agricultural Exp. Sta. at Matías Hernández, *Pittier 6859*.

Reputedly the common weed amaranth of the Caribbean, this species extends from Mexico through tropical South America and is adventive in Europe. In Panama, where the leaves and young shoots are employed as potherbs, the names *bledo* and *calalú* are applied. The Mayas call it *xetz* and *chactez*; Mexicans call the amaranths *quelite*, a name derived from an Aztec word and used for any potherb. The specific epithet is strongly suggestive of its specific status. It is weakly separated from *A. hybridus* L., from which it is frequently keyed by the length of the sepals in proportion to the length of the utricles. In individuals of both species, however, the utricles vary from shorter to longer than the sepals.

5. AMARANTHUS HYBRIDUS L. Sp. Pl. 990. 1753.

Amaranthus hypocondriacus L. Sp. Pl. 991. 1753.
Amaranthus hecticus Willd. Hist. Amaranth. 25. 1790.
Amaranthus strictus Willd. loc. cit. 27. 1790.
Amaranthus laetus Willd. loc. cit. 28. 1790.
Amaranthus chlorostachys Willd. loc. cit. 34. 1790.
Amaranthus retroflexus var. *hybridus* A. Gray, Man. ed. 5:412. 1867.
Amaranthus retroflexus var. *chlorostachys* A. Gray, loc. cit. 412. 1867.
Amaranthus chlorostachys var. *hybridus* S. Wats. in A. Gray, Man. ed. 6:428. 1889.
Amaranthus hybridus var. *hypocondriacus* B. L. Robinson, in Rhodora 10:32. 1908.
Amaranthus hybridus 2 *chlorostachys* G. Beck, in Reichenb. Ic. Fl. Germ. 24:175. 1908.
Galliaria hybrida Nieuwl. in Am. Midl. Nat. 3:278. 1914.

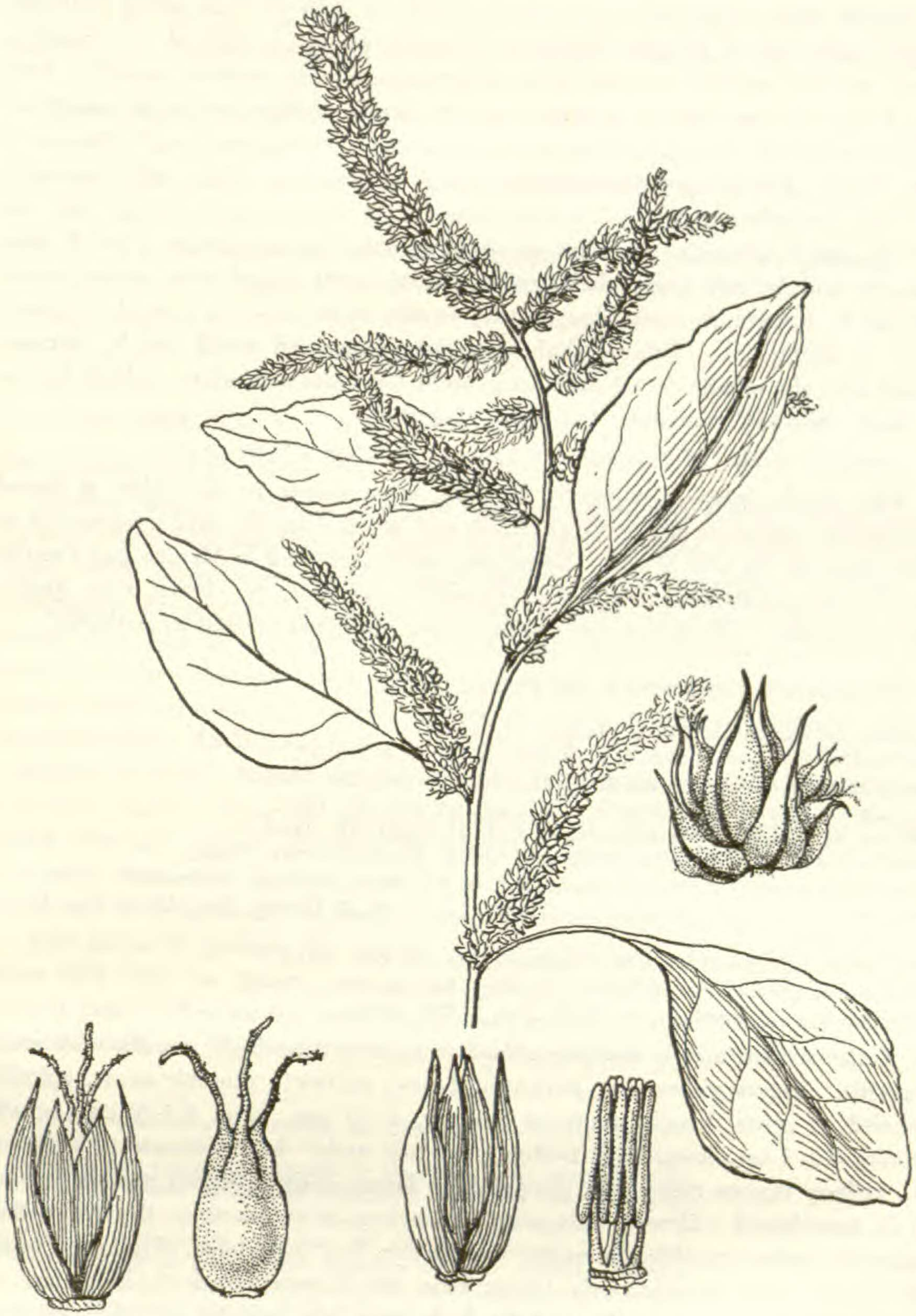

Fig. 113. *Amaranthus dubius*

Rather coarse often pubescent annuals to 2.5 m. high with ascending branches. Leaves pubescent or glabrous, entire to minutely crenulate, deltoid- to rhombic-ovate, apically rounded to acute, often mucronate, basally acute to rounded, 2–15 cm. long, 1–7 cm. broad; petioles 1–8 cm. long. Inflorescences of congested thyrses racemosely disposed, the terminal and axillary thyrses mostly cylindric, 6–12 mm. broad. Flowers polygamo-monoecious or monoecious; bracts and bracteoles subequal, lanceolate to ovate, 2–4 mm. long, often conspicuously longer than the flowers; sepals lanceolate to ovate or obovate, acute to acuminate, 1.5–2.5 mm. long, the midribs dark green, the margins scariose, rarely tinged with anthocyanins; stamens 5, discrete, 1–3 mm. long; ovary ovoid; styles (2–) 3, conical; stigmata (2–) 3, fimbrillate. Fruit a slightly rugose compressed ovoid utricle, circumscissile near the middle, 2–2.5 mm. long; seeds cochleate-orbiculate, reddish brown to black, minutely reticulate, 1–1.3 mm. broad.

CHIRIQUÍ: vicinity of Boquete, 1200–1500 m., *Woodson & Schery 722.*

This weedy species, frequently forming large stands in old fields, is found throughout temperate and tropical North and South America, and is adventive in many parts of the Old World. Vernacular names reported in Mexico and Central America are *quintoniles, calete, ses, huisquilete* and *quiec tes, bledo, xtez, quelite* and *huisquelite.* The leaves and young shoots are often cooked as potherbs.

6. AMARANTHUS SPINOSUS L. Sp. Pl. 991. 1753.

Amaranthus diacanthus Raf. Fl. Ludov. 31. 1817.
Amaranthus caracasanus H.B.K. Nov. Gen. & Sp. 2:195. 1817.
Amaranthus spinosus α rubricaulis Hassk. Flora 25: litt. 20. 1842.
Amaranthus spinosus β viridicaulis Hassk. loc. cit. litt. 20. 1842.
Amaranthus spinosus ζ pygmaeus Hassk. Cat. Pl. Bogor. 83. 1844.
Amaranthus spinosus β purpurascens Moq. in DC. Prodr. 13^2:260. 1849.
Amaranthus spinosus f. *inermis* Schum. & Laut. Fl. Deuts. Schutzg. Südsee 305. 1900.
Amaranthus spinosus I circumscissus Thellung in Asch. & Graebn. Syn. Mittel-Eur. Fl. 5: 269. 1914.
Amaranthus spinosus II basiscissus Thellung, loc. cit. 269. 1914.
Amaranthus spinosus III *indehiscens* Thellung, loc. cit. 269. 1914.
Galliaria spinosa Nieuwl. in Am. Midl. Nat. 3:278. 1914.

Rather coarse, mostly glabrous armed annuals to 2 m. high, usually with erect branches. Leaves glabrous or pubescent below, narrowly rhombic-ovate, apically rounded to acute, basally acute to cuneate, 1–12 cm. long, 0.5–5 cm. broad; petioles 0.5–8 cm. long, with 2 thorns in their axils. Inflorescences of terminal and axillary thyrses racemosely disposed, the lower axillary thyrses globose and up to 15 mm. broad. Flowers polygamo-monoecious or monoecious, the bracts and bracteoles rather variable, lanceolate to acicular, 1–5 mm. long, often resembling the thorns, some conspicuously longer than the flowers; sepals 5, lanceolate to oblong, 1–2.5 mm. long, the midribs dark-green, the margins scariose; stamens discrete, 1–2 mm. long; ovary ovoid; styles 3, conical; stigmata 3, fimbrillate. Fruit a slightly rugose compressed ovoid utricle, irregularly to regularly circumscissile, 1.5–2.5 mm. long; seeds cochleate-orbiculate, reddish brown to black, minutely reticulate, 0.7–1.0 mm. broad.

CANAL ZONE: Monkey Hill and vicinity, *Cowell 19*. CHIRIQUÍ: vicinity of Boquete, 1200–1500 m., *Woodson & Schery 723*; vicinity of Puerto Armuelles, 0–75 m., *Woodson & Schery 833*. COLÓN: Culebra, *Cowell 214*. HERRERA: vicinity of Ocu, 100 m., *Allen 4086*.

Presumably a native of America, this anthropochorous species now has a circumpolar distribution in temperate and tropical countries. In Panama it is probably called *bledo* and *calalú*. Other Mexican and Central American names are *xtez, kix-xtez, huisquelite, bledo macho, ixtez, tsetz, labtzetz* and *nigua*. In spite of the rather formidable thorns this species is also utilized as a potherb.

4. CHAMISSOA HBK.

CHAMISSOA HBK. Nov. Gen. & Sp. 2:196. 1817.

Kokera Adans. Fam. Pl. 2:269. 1763. hyponym.

Flowers perfect, subsessile, with 1–3 bracts subtending 1–5 bracteate fertile and 0–4 bracteate sterile flowers. Sepals 5, discrete, hypogynous, concave, greenish white, with conspicuous midribs and membranaceous margins. Stamens 5, hypogynous or perigynous, basally connate forming an exappendiculate tube shorter than, but occasionally basally fused with, the ovary; free portions of the filaments longer than the tube, usually somewhat flattened; anthers 4-locellate, introrse, medially attached. Ovary globose or ovoid, 1-locular, 1-ovulate; ovules campylotropous, the filiform arillate funicles with central basal placentae; styles 1, stigmata 2 (–3). Fruit a utricle circumscissile near the middle; seeds cochleate-orbiculate, black. Erect or clambering glabrate or pubescent herbs or shrubs. Leaves alternate, entire, petiolate or subsessile, linear-elliptic to broadly ovate, attenuate, deciduous. Inflorescences of axillary and terminal glomerules, these racemosely or paniculately disposed, with or without foliar leaves.

This genus of perhaps five species, is chiefly a South and Central American genus with only one species ranging as far north as Mexico. The closely related oriental genus *Allmania* has occasionally been treated as a subgenus but morphologically seems to deserve generic status. Two species of *Chamissoa* occur in Panama.

a. Terminal inflorescences pyramidal, the glomerules paniculately disposed; styles less than 1.5 times as long as the stigmata; ovary at anthesis tympaniform, truncate to the base of the style; sepals ovate, the outer more than 1 mm. broad; aril completely enveloping the seeds; seeds punctate.......... 1. C. ALTISSIMA

aa. Terminal inflorescences cylindric, the glomerules racemosely disposed; styles 2 times as long as the stigmata; ovary at anthesis doleiform, attenuate to the base of the style; sepals lanceolate, the outer less than 1 mm. broad; aril minute; seeds verrucose.......... 2. C. MAXIMILIANA

1. CHAMISSOA ALTISSIMA (Jacq.) HBK. Nov. Gen. & Sp. 2:197. 1817.

Celosia paniculata L. Sp. Pl. ed. 2:298. 1762. not L. 1753.
Achyranthes altissima Jacq. Enum. Pl. Carib. 17. 1762
Chamissoa macrocarpa HBK. Nov. Gen. & Sp. 2:197. 1817.

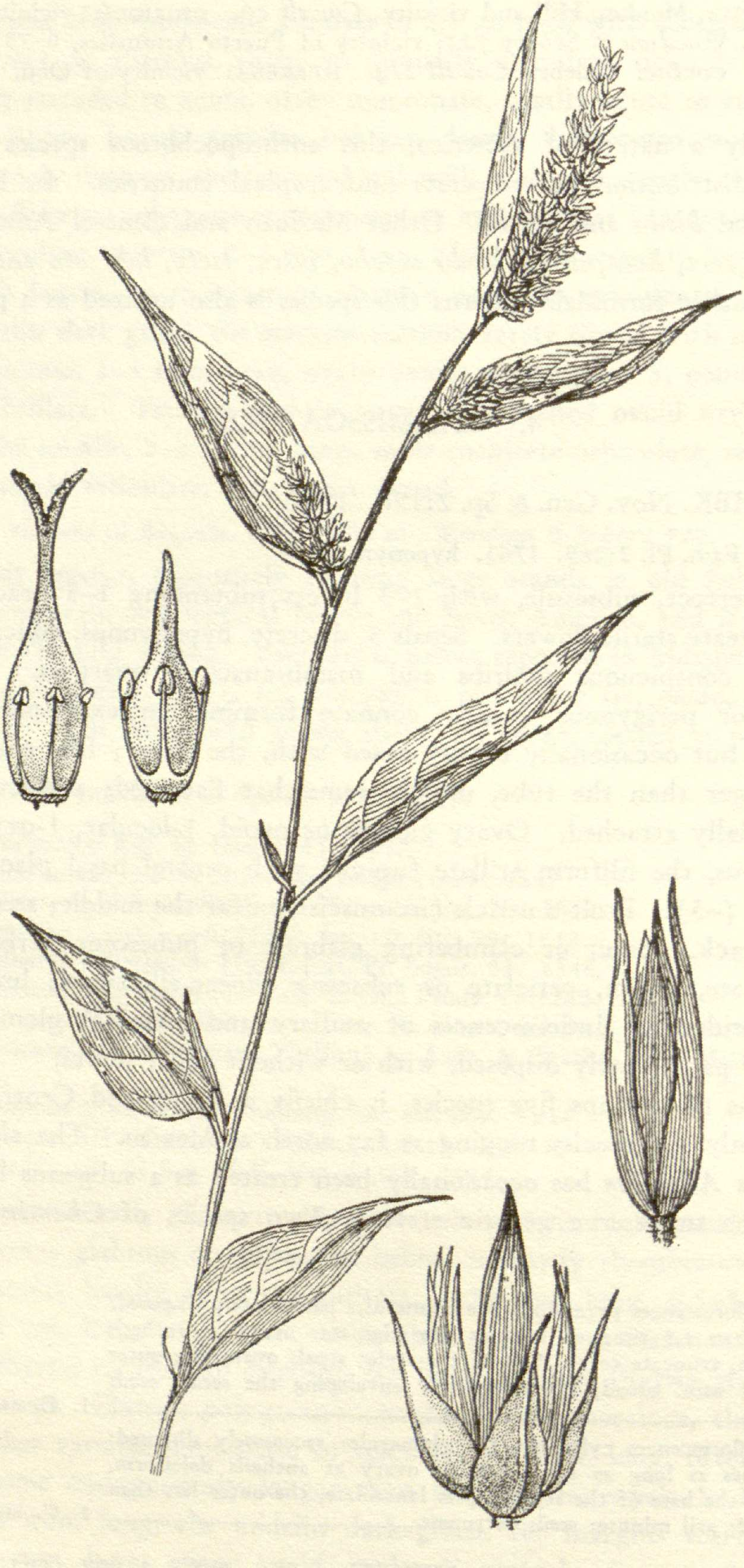

Fig. 114. *Chamissoa altissima*

Celosia tomentosa Willd. in Roem. & Schult. Syst. Veg. 5:531. 1819.
Achyranthes linkiana Roem & Schult. Syst. Veg. 5:545. 1819.
Chamissoa martii Moq. in DC. Prodr. 13^2:252. 1849.
Chamissoa altissima β laxiflora Moq. loc. cit. 251. 1849.
Chamissoa altissima γ densiflora Moq. loc. cit. 251. 1849.
Chamissoa altissima var. *β glabrata* Seub. in Mart. Fl. Bras. 5^1:242. 1875
Kokera paniculata O. Ktze. Rev. Gen. 542. 1891.
Chamissoa altissima var. *rubella* Suesseng. in Rep. Spec. Nov. 35:306. 1934.
Chamissoa altissima subsp. *albo-grisea* Suesseng. in Rep. Sp. Nov. 39:6. 1935.
Chamissoa altissima var. *grandispicata* Suesseng. loc. cit. 6. 1935.
Chamissoa altissima var. *grandispicata* f. *semispicata* Suesseng. loc. cit. 6. 1935.
Chamissoa altissima var. *densi-paniculata* Suesseng. in Lilloa 4:129. 1939.

Clambering subglabrous shrubs or vines to 3 m. high. Leaves glabrous or slightly pilose, broadly lanceolate to ovate, apically acute to acuminate and mucronate, basally truncate to acute, 3–14 cm. long, 1–6 cm. broad; petioles 0.5–3.5 cm. long. Inflorescences of glomerules paniculately disposed, the pubescent primary rhachis usually visible at intervals. Flowers perfect, some usually sterile, subsessile; bracts 1–3, broadly deltoid, carinate, mucronate, with membranaceous margins, 1–1.5 mm. long, 1–1.5 mm. broad; sepals 5, subequal, ovate, concave, acute to mucronate, 5-nerved, greenish white, 2.5–4 mm. long, 1–1.5 mm. broad; stamens 5; filaments 1.5–3 mm. long; filament tube 0.5–1 mm. long, often basally adnate to the ovary; anthers globose to oblong; ovary at anthesis tympaniform to globose, usually as broad as long and truncate or flanged at the summit; style 1, 0.5–1 mm. long, usually shorter than the stigmata; stigmata 2 (–3), erect at anthesis, reflexed in fruit. Fruit a utricle, exserted, circumscissile near the middle, compressed ovoid, the summit conspicuously operculate and truncate to inconspicuously operculate and rounded, 3–5 mm. long, 2–3.5 mm. broad, aril bivalvate, becoming wrinkled, brownish white, completely investing the seeds; seeds smooth but punctate, black, lustrous, 2–2.5 mm. broad.

BOCAS DEL TORO: Changuinola Valley, *Dunlop 309*; vicinity of Chiriquí Lagoon, *von Wedel 1380 & 1799*; Water Valley, vicinity of Chiriquí Lagoon, *von Wedel 634A, 840 & 1641*; Old Bank Island, vicinity of Chiriquí Lagoon, *von Wedel 1896 & 2141*; Garay Creek, vicinity of Chiriquí Lagoon, *von Wedel 2637*. CANAL ZONE: between Summit and Gamboa, *Greenman & Greenman 5258*. COCLÉ: vicinity of El Valle, 600–1000 m., *Allen 1205*; El Valle de Antón, trail near Finca Tomás Arias, 600 m., *Allen 4230*. DARIÉN: Tucutí, Chepigana, *Terry & Terry 1382*. PANAMÁ: Taboga Island, on more or less forested slopes, *MacBride 2823*.

This most commonly collected species in the genus ranges from Mexico to Argentina, usually in thickets where it tends to clamber over adjacent plants. Of limited occurrence in amazonian South America is a rather distinct type often regarded as a separate species, *C. macrocarpa* HBK., with rounded exoperculate, frequently 3-stylate utricles much longer than the sepals. Kuntze (Rev. Gen. 542. 1891), perhaps the first lumper, regards *C. macrocarpa* as conspecific with *C. altissima.* Annotation labels reveal that Schinz at one time considered *C. macrocarpa* as only a variety of *C. altissima*, and finally Suessenguth (in Rep. Sp. Nov. 35:306. 1934) admits that a sharp distinction between the two is impossible.

2. Chamissoa maximiliana Mart. ex Moq. in DC. Prodr. 13^2:251. 1849.

Chamissoa celosioides Griseb. in Goett. Abh. 19:79. 1874.
Chamissoa maximiliana var. *β procumbens* Seub. in Mart. Fl. Bras. 5^1:243. 1875.
Kokera celosioides (Griseb.) O. Ktze. Rev. Gen. 543. 1891.
Kokera acuminata (Mart.) O. Ktze. loc. cit. 543. 1891.
Chamissoa maximiliana var. *pubescens* Chod. in Bull. Herb. Boiss. 7:63. 1899.
Chamissoa maximiliana f. *celosioides* (Griseb.) Suesseng. in Rep. Sp. Nov. 35:306. 1934.

Clambering subglabrous herbs, shrubs or vines to 2 m. high. Leaves glabrous or slightly pilose, narrowly to broadly ovate, apically acuminate to mucronate, basally acute to rounded, 2.5–10 cm. long, 1–4 cm. broad; petioles 1–2.5 cm. long. Inflorescences of glomerules racemosely disposed, the pubescent primary rhachis usually obscured. (In the typical form the glomerules are not all closely approximated and the rhachis is visible at intervals.) Flowers perfect, some usually sterile, or tending to monoecism, subsessile; bracts 1–3, narrowly deltoid to lanceolate, carinate, mucronate, with membranaceous margins, 1.5–2 mm. long, 1–1.5 mm. broad; sepals 5, subequal, lance-oblong, concave, acuminate to mucronate, obscurely 3–7 nerved, greenish white, 3–4 mm. long, 0.5–1 mm. broad; stamens 5; filaments 1.5–3 mm. long; filament tube about 0.5 mm. long; ovary at anthesis doleiform, 1–2 times as long as broad, attenuate to the base of the style, often lobulate or flanged near the summit; style 1, 1–1.5 mm. long, longer than the stigmata; stigmata 2, erect at anthesis, reflexed in fruit. Fruit a utricle, usually included, circumscissile near the middle, globose to ovoid, the summit operculate and usually truncate, 2–3.5 mm. long, about 2 mm. broad; aril minute; seeds verrucose, black, often pleiochroistic, 1.5–2 mm. broad.

BOCAS DEL TORO: Water Valley, vicinity of Chiriquí Lagoon, *von Wedel 1441*; vicinity of Chiriquí Lagoon, *von Wedel 1695*. DARIÉN: vicinity of Cana, 1750 ft., *Stern, Chambers et al. 677*.

Inhabiting thickets and forest clearings, this species ranges from Costa Rica to Argentina. The Panama specimens seem referable to the forma *celosioides* (Griseb.) Suesseng. which differs from the typical form in possessing compact inflorescences. The type of *C. maximiliana* has lax inflorescences with subglobose operculate utricles. Three other species with minute arils occur in South America. *C. acuminata* Mart., with smooth seeds and petiolate, narrowly ovate falcate leaves, occurs in Brazil and northern Argentina. *C. blanchetii* Moq., with smooth but punctate seeds and subsessile linear-elliptic leaves, occurs in Brazil. *C. brasiliana* (Moq.) R. E. Fr., native to Brazil and Argentina, differs from all other species in having axillary verticillate glomerules.

5. ACHYRANTHES L.

Achyranthes L. Sp. Pl. 20. 1753.

Centrostachys Wall. in Roxb. Fl. Ind. 2:497. 1824.
Cadelaria Raf. Fl. Tell. 3:39. 1837.
Stachyarpagophora Vaill. in Maza, Fl. Haban. 92. 1897.

Flowers perfect, bracteate and bibracteolate, subsessile in elongate spikes.

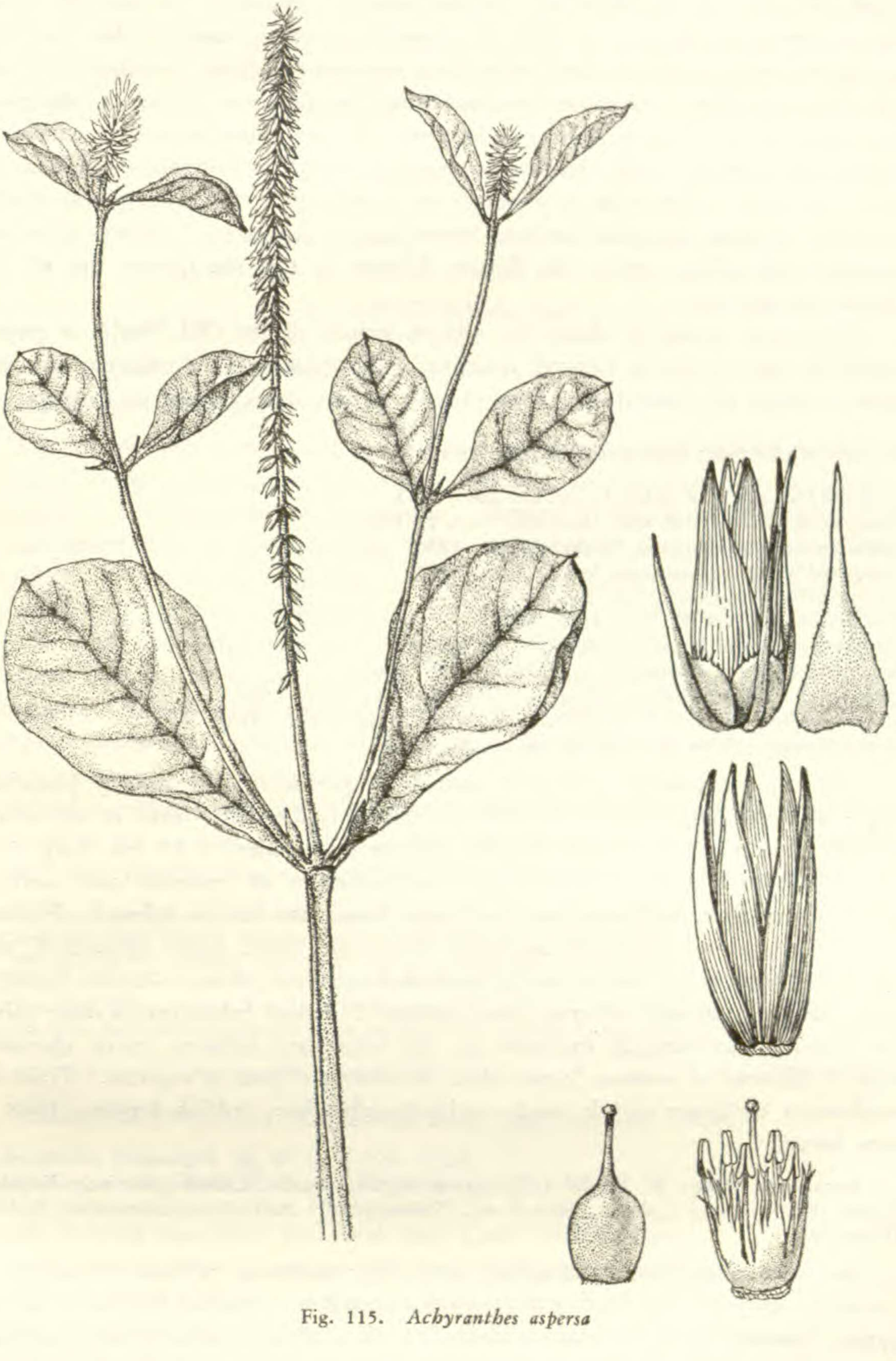

Fig. 115. *Achyranthes aspersa*

Sepals 4–5, discrete, hypogynous, concave, subequal, obscurely 3–5 nerved, occasionally pungent. Stamens 2–5, the filaments flattened and united below forming an appendiculate tube; anthers 4-locellate, introrse, medially attached. Ovary obovoid, 1-locular, 1-ovulate; ovules campylotropous on elongate flattened funicles; style 1, filiform; stigma 1, capitate. Fruit a membranaceous turbinate indehiscent utricle; seeds cochleate-orbiculate, reddish brown. Glabrous to pubescent erect or decumbent annual or perennial herbs. Leaves opposite, short-petiolate, scantily appressed strigose to sericeous, deciduous. Inflorescences of terminal and axillary spikes, the flowers deflexed in age, the spinose tips of the bracts not uncinate.

This weedy genus, of about five species, mostly of the Old World, is represented by one species in Central America. The spines of the inflorescences are often a source of discomfort. Two varieties of one species occur in Panama.

1. Achyranthes aspersa L. Sp. Pl. 204. 1753.

Achyranthes aspersa β indica L. loc. cit. 204. 1753.
Achyranthes indica Mill. Gar. Dict. ed. 8: no. 2. 1768.
Achyranthes argentea Lam. Encycl. 1:545. 1785.
Achyranthes obtusifolia Lam. loc. cit. 545. 1785.
Achyranthes sicula Roth, Cat. Bot. 1:39. 1797.
Cadelaria sicula Raf. Fl. Tell. 3:39. 1837.
Cadelaria indica Raf. loc. cit. 39. 1837.
Stachyarpagophora aspersa Maza, Fl. Haban. 93. 1897.
Achyranthes aspersa simplex Millsp. in Field. Mus. Bot. 2:36. 1900.
Centrostachys indica (L.) Standl. in Jour. Wash. Acad. 5:75. 1915.
Centrostachys aspersa (L.) Standl. loc. cit. 75. 1915.

Erect or procumbent pubescent annuals or perennials, the usually branched stems to 2 m. long. Leaves scantily to densely pubescent, ovate to orbicular, apically acuminate to rounded, basally cuneate to rounded, 2–25 cm. long, 2–9 cm. broad; petioles 2–25 mm. long. Inflorescences of terminal and axillary pedunculate spikes, 3–40 cm. long, 6–12 mm. broad, the flowers deflexed. Flowers perfect; bracts and bracteoles subequal, 2–3.5 mm. long, ovate, spinescent, the tips rarely arcuate but not uncinate; sepals 4–5, greenish white, subequal, hypogynous, obscurely nerved, 4–7 mm. long; stamens 5, united below into a short tube; pseudostaminodia lacerate, exceeded by the 4-locellate anthers; ovary obovoid; style 1, filiform, at anthesis longer than the ovary; stigma 1, capitate. Fruit an indehiscent turbinate utricle; seeds cochleate-orbiculate, reddish brown, about 1 mm. broad.

BOCAS DEL TORO: *H. Wedel 418.* CANAL ZONE: Gatún, *Cowell 300*; near Frijoles, *Pittier 6834*; around Culebra, 50–150 m., *Pittier 4068.* PROVINCE UNKNOWN: *Sutton Hayes 320.*

A rather ubiquitous pantropical weed, this species is perhaps adventive in America. In India the dried inflorescences are used by orthodox Hindus in sacred pyres. Standley & Steyermark (in Field Mus. Bot. 24^4:145. 1946), who maintain *A. indica* as specifically distinct from *A. aspersa,* say that *A. indica* is scarce in Central America and known only from the Atlantic Coast, in contrast to the widely distributed *A. aspersa.* The variety *indica* seems to be rather regularly distinct from the variety *aspersa* in having rounded leaves and shorter sepals. All the cited specimens except *Hayes 320* seem referable to the variety *indica.* Many vernacular names are reported; *zacpaiché* and *zorillo blanco* in the Yucatan, *abrojo* in Salvador, *mozote* in Salvador and Honduras, *mozotillo* and *rabo de chanco* in Costa Rica, *cola de armado, penegato, pije de gato* and *chile de perro* in Guatemala where the typical variety is apparently distinguished by the natives from the variety *indica* to which the names *pegapega, goincilla* and *mozotlexc* are applied.

6. CYATHULA Lour.

CYATHULA Lour. Fl. Cochinch. 1:101. 1790.

Polyscalis Wall. Cat. no. 6939. 1832.

Flowers perfect, some sterile and highly modified, bracteate and bibracteolate, subsessile in short-pedunculate glomerules. Sepals 5, discrete, hypogynous, concave, subequal, 1–3 ribbed, occasionally pungent. Stamens 5, the filaments flattened and united below into an appendiculate tube; anthers 4-locellate, introrse, medially attached. Ovary ovoid, 1-locular, 1-ovulate; ovules campylotropous on elongate flattened funicles; style 1, filiform; stigma 1, capitate. Fruit an ovoid indehiscent utricle; seeds cochleate-orbiculate, succineous. Pubescent branched ascending to prostrate occasionally frutescent herbs. Leaves opposite, entire, petiolate, strigose, deciduous. Inflorescences spicate, composed of terminal and axillary thyrses of complex glomerules containing some highly modified flowers with some of the bracts and sepals uncinate-spinescent.

Of this rather weedy genus of some twenty species, most of the species are centered in Africa and the Orient. Only two occur in Central America, usually in disturbed habitats of low elevations, where they may become annoying weeds.

a. Terminal spikes 2–10 times as long as the uppermost leaves, interrupted over half their length; lower glomerules with mostly 3 fertile flowers and around 40 uncinate structures 1–2 mm. long; seeds 1–1.5 mm. broad; sepals 2–3 mm. long; pseudostaminodia 3-toothed........................ 1. C. PROSTRATA

aa. Terminal spikes 1–2 times as long as the uppermost leaves, interrupted less than half their length; lower glomerules with 1 fertile flower and around 12 uncinate structures 1–4 mm. long; seeds 1.5–2 mm. broad; sepals 2.5–4 mm. long; pseudostaminodia irregularly lacerate.................. 2. C. ACHYRANTHOIDES

1. CYATHULA PROSTRATA (L.) Blume, Bijdr. Ned. Ind. 549. 1826.

Achyranthes prostrata L. Sp. Pl. ed. 2:296. 1762.
Cyathula geniculata Lour. Fl. Cochinch. 1:102. 1790.
Desmochaeta prostrata DC. Cat. Hort. Monsp. 102. 1813.
Pupalia prostrata Mart. Nova Acta Acad. Leop.-Carol. 13^1:321. 1826.

Erect or decumbent geniculate pubescent perennials to 1 m. high, often rooting at the lower nodes. Leaves strigose on both surfaces, entire or undulate, ovate to obovate, apically acute, basally acute to rounded, 2–6 cm. long, 1–4 cm. broad; petioles 2–8 mm. long. Inflorescences of terminal and axillary spikes of glomerules, the mature glomerule usually consisting of a central terminal perfect flower and 2

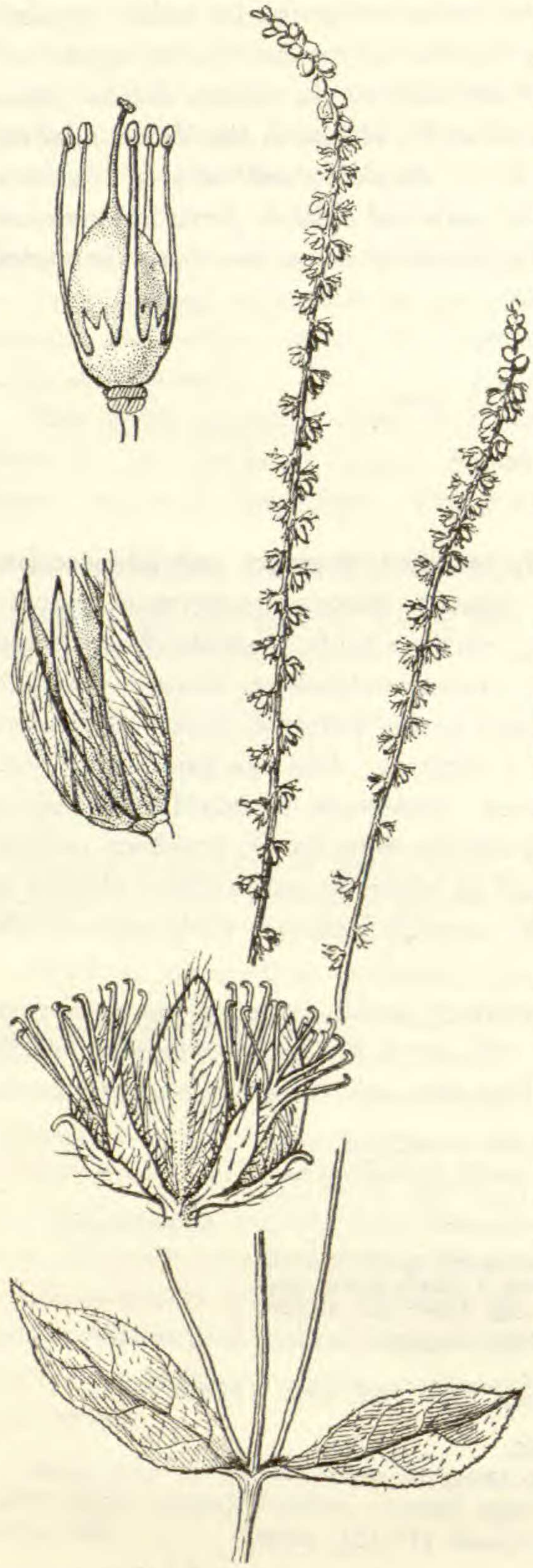

Fig. 116. *Cyathula prostrata*

lateral perfect flowers, each of the lateral flowers subtended on each side by a cluster of about 20 hooks representing 3 modified flowers, the hooks not conspicuously longer than the glomerule, the peduncle of the glomerule articulated near the pubescent primary rhachis; spikes 5–30 cm. long, 4–7 mm. broad, with only the distal half continuous. Unmodified flowers perfect; bracts and bracteoles subequal, ovate, mucronate or aristate, 1–1.5 mm. long; sepals 5, subequal, ovate, concave, scariose, pubescent throughout their length, with 1–3 ribs strongly exserted dorsally, 2–3 mm. long; stamens 5, 1–2 mm. long, united below to form a tube bearing 5 intercalated 3-dentate pseudostaminodia; ovary at first tympaniform, becoming ovoid; style 1, stigma 1, at anthesis about equaling the stamens. Utricle ovoid, inconspicuously operculate, 1–2 mm. long; seeds cochleate-orbiculate, succineous, smooth 1–1.5 mm. long.

BOCAS DEL TORO: vicinity of Chiriquí Lagoon, *von Wedel 1357*; Water Valley, vicinty of Chiriquí Lagoon, *von Wedel 1696A*; Bastimentos, Mariano Creek, vicinity of Chiriquí Lagoon, *von Wedel 2898*.

Probably adventive in the Americas where it has a rather spotty distribution, this species is presumed to be native in tropical Asia and Africa. The glomerules are similar in complexity to the spikelets of some grasses, and they probably cling rather tenaciously to fur and clothing

2. CYATHULA ACHYRANTHOIDES (HBK.) Moq. in DC. Prodr. 13^2:326. 1849.

Desmochaeta achyranthoides HBK. Nov. Gen. & Sp. 2:210. 1817.
Desmochaeta densiflora HBK. loc. cit. 211. 1817.
Desmochaeta uncinata R. & S. Syst. Veg. 5:554. 1819.
Pupalia densiflora Mart. Nov. Gen. & Sp. 2:61. 1826.
Cyathula achyranthoides β glabrescens Moq. in DC. Prodr. 13^2:327. 1849.
Cyanthula achyranthoides γ densiflora Moq. loc. cit. 327. 1849.
Achyranthes hirtiflora A. Rich. in Sagra, Hist. Cuba 11:175. 1850.
Cyathula prostrata β achyranthoides O. Ktze. Rev. Gen. 542. 1891.

Erect or decumbent geniculate pubescent or glabrate annuals or perennials to 1 m. high, often rooting at the lower nodes. Leaves usually strigose on both surfaces, entire or slightly undulate, ovate to rhombic-ovate, apically acuminate to attenuate, basally acute to cuneate, 4–15 cm. long, 1.5–5 cm. broad; petioles 2–10 mm. long. Inflorescences of terminal and axillary spikes of glomerules, the mature glomerule usually consisting of a fertile lower flower and a rudimentary, rarely perfect, terminal flower with 2 of its sepals uncinate-aristate, the terminal flower subtended on each side by a cluster of 3–7 hooks representing 1 modified flower, some of the hooks conspicuously longer than the glomerule; spikes 3–15 cm. long, 5–7 mm. broad, interrupted less than half their length; bracts and bracteoles subequal, ovate, concave, mucronate or aristate, 1.5–3 mm. long; sepals 5, subequal, ovate, concave, scariose, usually pubescent only at the extremities, with 1–3 ribs occasionally strongly exserted dorsally, 2.5–4 mm. long, 1–1.5 mm. broad; stamens 5, 1–2 mm. long, united below forming a tube bearing 5 intercalated irregularly lacerate pseudostaminodia; ovary at first tympaniform, becoming ovoid; style 1, stigma 1, at anthesis about equaling the stamens. Utricle ovoid, rather conspicuously operculate, 1.5–2.5 mm. long; seeds cochleate-orbiculate, succineous, smooth, 1.5–2.5 mm. long.

BOCAS DEL TORO: vicinity of Nievecita, ca. 0–50 m., *Woodson, Allen & Seibert 1806*; Little Bocas, vicinity of Chiriquí Lagoon, *von Wedel 2525*: Peach Creek, vicinity of Chiriquí Lagoon, *von Wedel 2650*; Water Valley, vicinity of Chiriquí Lagoon, *von Wedel 610 & 1142*. CANAL ZONE: shrubby grassy trail-border, *MacBride & Featherstone 2779*; Balboa Heights, *Greenman & Greenman 5038*. COLÓN: Juan Mina plantation, Río Chagres, region above Gamboa, 25 m., *Allen 4119*. DARIÉN: trail between Paya and Pucro, *Stern, Chambers et al. 402A*; vicinity of Boca de Cupe, ca. 40 m., *Allen 891*. VERAGUAS: between R. Tabasará and Soná on highway, *Woodson, Seibert & Allen 504*.

Extending from Mexico and the West Indies to Brazil, this species is rather common in low-elevation disturbed habitats of tropical America. In Guatemala it is called *cola de armado* and in Honduras, *mozote*. The stouter hooks of the glomerules of this species may perhaps make them more painful and tenacious clingers than those of the preceeding species.

7. PFAFFIA Mart.

PFAFFIA Mart. Nov. Gen. & Sp. 2:20. 1826.

Serturnera Mart. loc. cit. 36. 1826.
Hebanthe Mart. loc. cit. 42. 1826.

Flowers normally perfect, bracteate and bibracteolate, sessile, often with an unpleasant odor. Sepals 5, discrete, hypogynous, concave, subequal, the outer 3 slightly larger, often 3-ribbed, greenish white, becoming scariose, with a conspicuous tuft of intertwined whitish hairs arising mostly within and longer than the outer sepals. Stamens 5, the filaments flattened and united below forming an entire or appendiculate tube; anthers 2-locellate, introrse, medially attached. Ovary ovoid to obovoid, 1-locular, 1-ovulate; ovules campylotropous on elongate flattened funicles; style 1, very short; stigma 1, bilabiate, exceeding the style. Fruit an indehiscent utricle; seeds cochleate-orbiculate, reddish brown. Subglabrous or copiously pubescent clambering vines or erect shrubs. Leaves opposite, entire to undulate, subsessile to short petiolate, glabrate to densely pubescent. Inflorescences paniculate with opposite branches or verticillate branches ultimately bearing spikes. (In some South American species, the inflorescence consists of condensed terminal heads.)

Of this predominantly South American genus of some twenty species, two members of the clambering section HEBANTHE are found in Panama, one apparently reaching its northernmost station here. Stützer in a generic monograph (in Rep. Spec. Nov. Beih. 88:2. 1935) has noted that the section HEBANTHE is closer related to *Iresine* § TROMMSDORFFIA than to the other two sections of the genus *Pfaffia*.

a. Mature sepals 2–3.5 mm. long, the ribs often not obvious to the naked eye; rhachises and lower leaf surfaces densely rufous-pubescent; stamen tube entire........ 1. P. GRANDIFLORA

aa. Mature sepals 1.5–2.5 mm. long, the ribs obvious to the naked eye; rhachises and lower leaf surfaces slightly cinereous-pubescent; stamen tube with 2 rounded teeth between adjacent filaments........ 2. P. PANICULATA

1. PFAFFIA GRANDIFLORA (Hook.) R. E. Fr. in Ark. Bot. 16^{12}:10. 1921.

Iresine grandiflora Hook. in Icon. Pl. 2: tab. 102. 1837.
Gomphrena paniculata var. γ *hookeriana* Seub. in Mart. Fl. Bras. 5^1:192. 1875.
Hebanthe decipiens Hook. f. in Benth. & Hook. f. Gen. Pl. 3:41. 1880.
Hebanthe hookeriana Hems. Biol. Cent. Am. 3:19. 1882.
Gossypianthus hookerianus O. Ktze. Rev. Gen. 543. 1891.
Gossypianthus decipiens O. Ktze. loc. cit. 543. 1891.
Pfaffia hookeriana (Hems.) Greenm. in Field Mus. Bot. 2:330. 1912.
Pfaffia grandiflora (Hook.) R. E. Fr. in Stützer, in Rep. Spec. Nov. Beih. 88:9. 1935.
Pfaffia grandiflora var. *hookeriana* Stützer, loc. cit. 10. 1935.

Suffrutescent, usually pubescent, clambering perennials to about 3 m. long. Leaves rufous-strigose, at least below, lanceolate to broadly ovate, apically acute to attenuate, basally rounded to acute, 2–10 cm. long, 1–5 cm. broad; petioles 2–10 mm. long. Inflorescence a terminal panicle of pedunculate, opposite or verticillate, simple or compound spikes, the lower often subtended by reduced leaves, the rhachises and peduncles densely rufous-pubescent. Flowers perfect, often infertile, sessile; bracts and bracteoles subequal, broadly ovate, rufous-tomentose, 1–2 mm. long, 1–2 mm. broad; sepals 5, subequal, elliptic, the ribs obscured by the pubescence, 2–3.5 mm. long, 1–2 mm. broad; stamens 5, 1.5–2.5 mm. long, united below into an exappendiculate tube about 0.5 mm. long; ovary at anthesis ovoid; stigma 1, bilabiate, subsessile. Fruit an included indehiscent utricle to 2 mm. long; seeds cochleate-orbiculate, reddish brown, about 1.5 mm. long, on a funicle up to 1 mm. long.

DARIÉN: Cana and vicinity, 2000–6500 ft., *Williams 828*.

This species ranges from Mexico to British Guiana and Peru. Standley (in Contr. U. S. Nat. Herb. 27:174. 1928) reports this species, as *P. hookeriana* (Hems.) Greenm., to have been collected at Gatuncillo. His identification is questionable however since he keys the species as having lobed stamen tubes. The reliability of pseudostaminodial characters is thrown open to suspicion by examination of *Williams 828* from Darién. In this specimen, possibly a hybrid between *P. grandiflora* and *P. paniculata*, although leaning strongly toward the former in other characters, the stamen tube in a single flower has pseudostaminodia between some filaments and none between others. Both Fries (in Ark. Bot. 16^{12}:10. 1921) and Standley (in Field Mus. Bot. 13:490. 1936) have erroneously associated the name *P. grandiflora* (Hook.) R. E. Fr. with *P. brachiata* Chod. (incl. *P. bangii* R. E. Fr.), a species differing by its striking dendroid pubescence.

2. PFAFFIA PANICULATA (Mart.) O. Ktze. Rev. Gen. 542. 1891.

Iresine erianthos Poir. in Lam. 3: suppl. 180. 1813.
Hebanthe paniculata Mart. Nov. Gen. & Sp. 2:140. 1826.
Hebanthe virgata Mart. loc. cit. 143. 1826.
Iresine paniculata Spreng. Syst. Veg. Cur. Post. 103. 1827.
Gomphrena paniculata Moq. in DC. Prodr. 13^2:385. 1849.
Xerea paniculata O. Ktze. Rev. Gen. 545. 1891.
Pfaffia eriantha (Poir.) O. Ktze. loc. cit. 543. 1891.

Suffrutescent subglabrous clambering perennials to about 3 m. long. Leaves glabrous to appressed strigose below, lanceolate to ovate, apically acute, basally rounded to cuneate, 2–8 cm. long, 1–4 cm. broad; petioles 2–7 mm. long. Inflorescence a terminal panicle of pedunculate, opposite or verticillate, simple or compound spikes, the lowermost often subtended by reduced leaves, the rhachises and peduncles slightly cinereous-pubescent. Flowers perfect, often infertile, sessile, bracts and bracteoles subequal, broadly ovate, translucent except for the carinae, 1–1.5 mm. long, 1–2 mm. broad; sepals 5, subequal, elliptic, the outer 3 conspicuously 3-ribbed, 1.5–2.5 mm. long, 1–1.5 mm. broad; stamens 5, 1.5–2 mm. long, united below into a tube with 2 rounded lobes between adjacent filaments, the tube about 0.5 mm. long; ovary at anthesis obovoid, occasionally distally 4-lobate; stigma 1, bilabiate, subsessile. Fruit an included indehiscent utricle about 1 mm. long; submature seeds cochleate-orbiculate, reddish brown, about 0.5 mm. broad, on funicles about 1 mm. long.

COCLÉ: El Valle, floor, 1800 ft., *Allen 4475*.

This species, far from its reported range of Brazil to Peru and Paraguay, is possibly a recent introduction in Panama. The conspicuous cottony mass of hairs are certainly an aid to fruit dispersal. Three recent works on *Pfaffia* (Fries, in Ark. Bot. 16^{12}:1. 1921; Suessenguth in Rep. Sp. Nov. 35:325. 1934; and Stützer, in

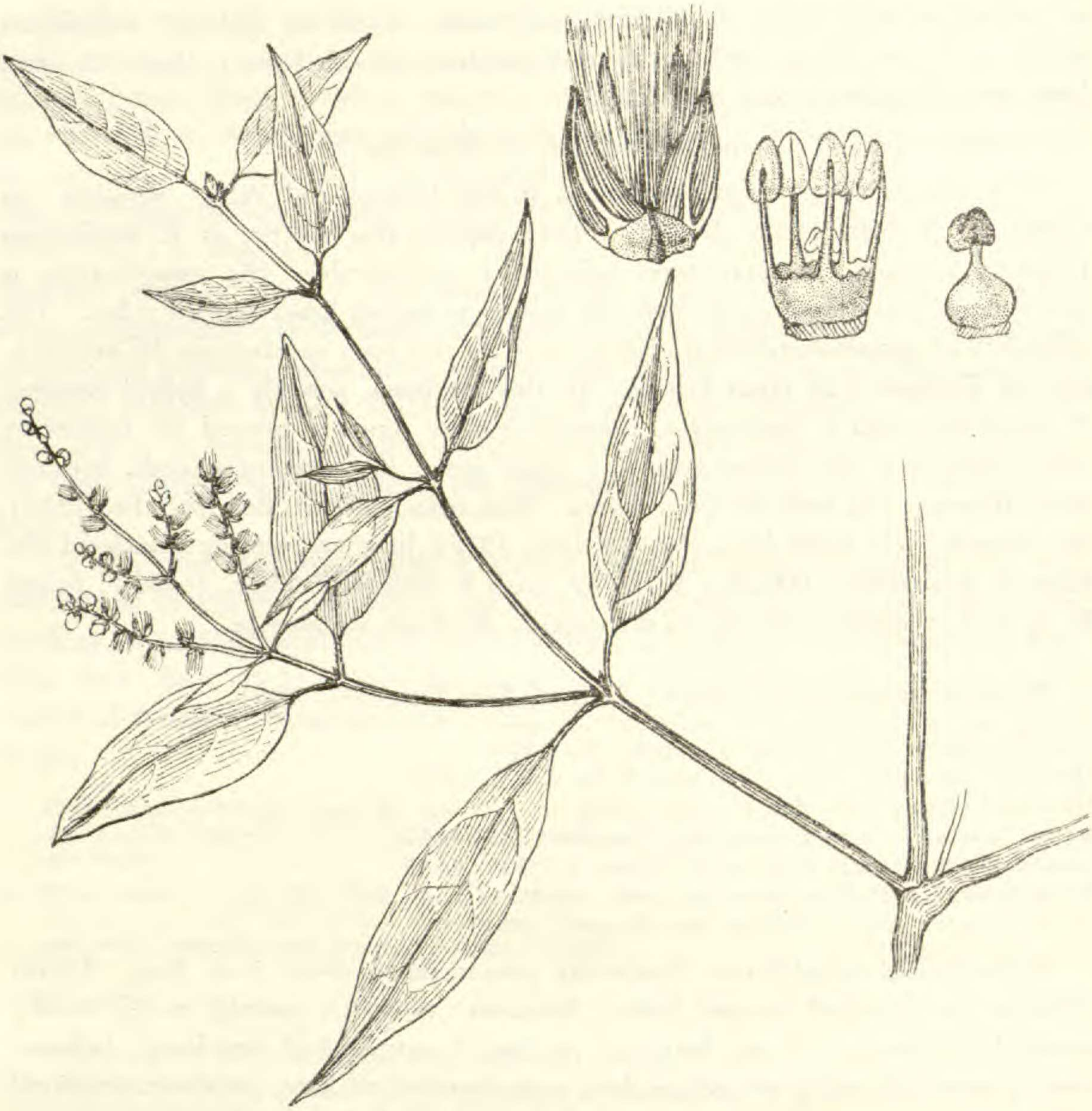

Fig. 117. *Pfaffia paniculata*

Rep. Sp. Nov. Beih. 88:1. 1935) all recognize that *P. eriantha* was described from a monstrosity. This monstrosity, which occurs in at least three species, has many or all of the flowers reduced to small sterile clusters of short stout hairs. However any flowers that may develop normally are adequate for identification. Moquin (in DC. Prodr. 13^2:386. 1849), who examined the type of *P. eriantha,* gives a description adequate to identify it with *P. paniculata.* International rules of nomenclature recommend that names based on monstrosities be rejected; therefore the name *P. paniculata* is upheld.

8. IRESINE P. Br.

IRESINE P. Br. Hist. Jam. 358. 1756.

Trommsdorffia Mart. Nov. Gen. & Sp. 2:40. 1826.
Rosea Mart. loc. cit. 58. 1826.
Xerandra Raf. Fl. Tell. 3:43. 1837.
Ireneis Moq. in DC. Prodr. 13^2:349. 1849.

Flowers perfect, polygamous or dioecious, bracteate and bibracteolate, subsessile in spikes or glomes. Sepals 5, discrete, hypogynous, concave, subequal, becoming scariose, often with conspicuous tufts of hairs between the sepals and the bracteoles. Stamens 5, the filaments flattened and united below into an entire or appendiculate tube; anthers bilocellate, oblong, introrse, medially attached. Ovary 1-locular, 1- ovulate; ovule campylotropous on an elongate flattened funicle; stigmata 2–3, filiform or deltoid. Fruit an indehiscent utricle; seeds cochleate-orbiculate, whitish or reddish brown, smooth. Glabrous to copiously pubescent herbs, shrubs, trees or clambering vines. Leaves opposite, entire to denticulate, petiolate, glabrous to sericeous, herbaceous to coriaceous. Inflorescences of spikes or glomes, paniculately disposed, the branching alternate, opposite or verticillate.

This heterogeneous genus, of some forty species, is largely if not wholly native to the Americas. I have seen no specimens, except of the cultivant *Iresine herbstii* Hook., from outside the Americas and the West Indies. *Iresine herbstii* is cultivated in many places for its attractive variegated red and yellow foliage, but I have seen no specimens from Panama. The genus, and especially the polygamous and dioecious species, are sorely in need of revision. Four species are known to occur in Panama.

a. Flowers perfect or polygamous; spikes ovoid or globose, pedunculate, alternate, opposite or verticillate on the rhachis; seeds whitish or reddish brown; style about half as long as the stigmata; herbaceous or suffruticose perennials, often clambering.

b. Leaves near the inflorescence ovate or elliptic, their petioles amplexicaul; spikes mostly opposite or verticillate; rhachises obviously cinereous-pubescent; stigmata deltoid, scarcely reflexed; seeds whitish.

c. Leaves densely pubescent below; intrafloral hairs about equaling the calyx; pseudostaminodia bilobate; utricle 1–1.3 mm. long................ 1. I. HASSLERIANA

cc. Leaves sparsely strigose below; intrafloral hairs about twice as long as the calyx; pseudostaminodia deltoid or absent; utricle 1.5–2 mm. long................ 2. I. COMPLETA

bb. Leaves near the inflorescence linear or lanceolate, their petioles mostly not amplexicaul; spikes mostly alternate; rhachises glabrate or obscurely puberulent; stigmata filiform, ultimately reflexed; seeds reddish brown................ 3. I. ANGUSTIFOLIA

aa. Flowers strictly dioecious; spikes filiform or narrowly pyramidal, mostly sessile, alternate on the rhachis; seeds reddish brown; style obsolete, less than a third as long as the filiform stigmata; herbaceous upright or ascending perennials................ 4. I. CELOSIA

1. **IRESINE HASSLERIANA** Chod. in Bull. Herb. Boiss. 2^3:390. 1903.

Iresine macrophylla R. E. Fr. in Ark. Bot. 16^{12}:41. 1921.

Erect or clambering shrubs, the younger branches cinereous-pubescent. Leaves

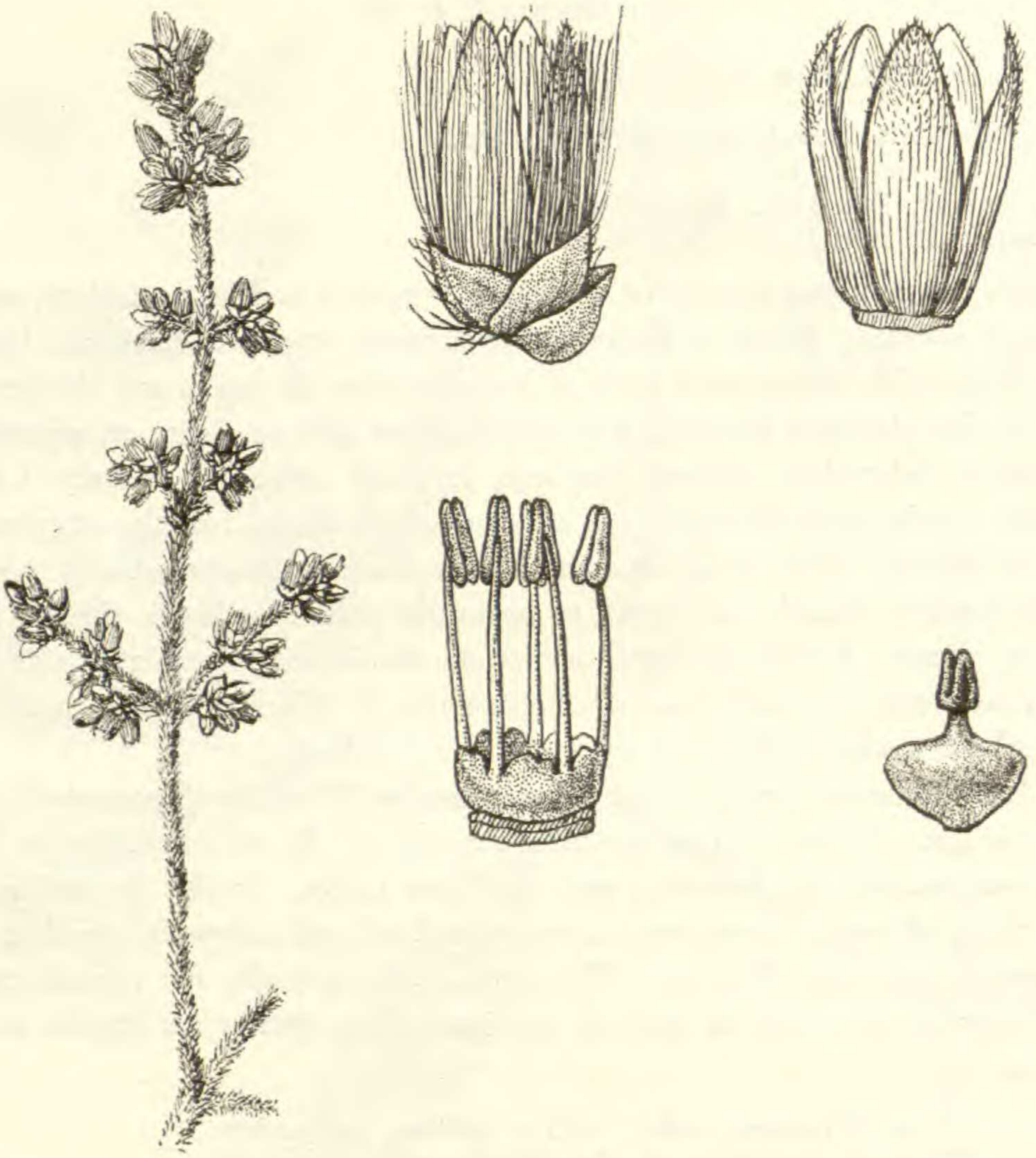

Fig. 118. *Iresine hassleriana*

herbaceous to coriaceous, appressed pubescent below, glabrate above, narrowly elliptic to ovate, apically acute to attenuate and mucronate, basally rounded to acute, 2–15 cm. long, 1–8 cm. broad; petioles 3–15 mm. long. Inflorescence a panicle of opposite or verticillate pedunculate glomes, the rhachises cinereous-pubescent. Flowers perfect, the bracts and bracteoles subequal, orbicular, apically rounded, concave, entire, transparent, 1–1.5 mm. long, with a conspicuous tuft of hairs about equaling the sepals in length and arising between the bracts and the sepals; sepals 5, subequal, oblong-ovate, acute, obscurely 3–5 nerved, 1.5–2 mm. long; stamens 5, united below into a shallow tube bearing two rounded lobes between adjacent filaments; ovary subglobose; style 1, shorter than the 2 deltoid stigmata. Fruit an indehiscent ovoid utricle, 1–1.3 mm. long; seeds whitish, cochleate-orbiculate, about 1 mm. long.

PROVINCE UNKNOWN: *Sutton Hayes 934.*

Apparently reaching its northern limits in Panama, this species is also found in

Peru, Bolivia, Brazil and Colombia. Specimens from the northern half of the range tend to have smaller less coriaceous leaves. *Iresine domingensis* Urban, described from Haiti, is a very closely related species, which Suessenguth (in Rep. Sp. Nov. 35:320. 1934) reports from Trinidad and Venezuela.

2. **IRESINE COMPLETA** Uline & Bray, in Bot. Gaz. 21:349. 1896.

Erect or clambering shrubs, the younger branches cinereous-pubescent. Leaves herbaceous, glabrate or scantily strigose below, ovate, apically attenuate and mucronate, basally acute, 1.5–11 cm. long, 1–5.5 cm. broad; petioles 4–10 mm. long. Inflorescence a panicle of opposite or verticillate pedunculate glomes, the rhachises cinereous-pubescent. Flowers perfect (or polygamous?); bracts and bracteoles subequal, broadly ovate, acute, concave, entire, transparent, about 1 mm. long, with a conspicuous tuft of septate hairs about twice as long as the sepals arising between the bracts and the sepals; sepals 5, subequal, oblong-ovate, acute, obscurely 3-nerved, 2–2.5 mm. long; stamens 5, united below into a shallow tube bearing obscure broadly deltoid pseudostaminodia between adjacent filaments; ovary subglobose; style 1, slightly shorter than the 2 deltoid stigmata. Fruit an indehiscent ovoid utricle, 1.5–2 mm. long; seeds whitish, cochleate-orbiculate, about 1.5 mm. long.

DARIÉN: above Paca and near Cana, *Williams 706*.

Ranging from Panama to Guatemala, this species is nowhere commonly collected. The cited specimen, annotated by Standley, agrees with the original descriptions in all respects except that the pseudostaminodia are not prominent. Uline & Bray (in Bot. Gaz. 21:349. 1896) have emphasized that the type, *Thieme 338*, collected in 1888, is completely hermaphroditic. Donnell Smith (Enum. Plant. Guat. 5:72. 1899) cites two of Thieme's collections, omitting Thieme's numbers, and using his own numbers, *5443* collected in 1889 and *5447* collected in 1890, as *Iresine completa*. *Donnell Smith 5447* is however the staminate plant of a dioecious or polygamous species and has obvious pistillodes. It is obviously not the specimen used in the original description. Nevertheless Suessenguth (in Rep. Sp. Nov. 35:320. 1935) offers us his "*Ergänzung zur Originaldiagnose*" citing *Donnell Smith 5447* as the type. This cannot be the holotype because the flowers are not perfect, they lack the basal tuft of hairs and they lack the orbicular utricles. It is possible, but presently strictly conjectural, that *I. completa* is polygamous with the pistillate flowers perfect and the staminate flowers bearing pistillodes.

3. **IRESINE ANGUSTIFOLIA** Euphr. Beskr. St. Barth. 165. 1795.

Iresine elatior Rich. in Willd. Sp. Pl. 4:766. 1805.
Iresine racemosa Poir. in Lam. Encycl. Suppl. 3:180. 1813.
Rosea elatior Mart. Nov. Gen. & Sp. 2:59. 1826.
Xerandra elatior Raf. Fl. Tell. 3:43. 1837.
Alternanthera linearis Bello, in Anal. Soc. Esp. Hist. Nat. 12:107. 1883.

Erect or reclining suffruticose perennials to 1 m. high, the younger branches glabrous or scantily strigose below, lanceolate to narrowly ovate, apically attenuate and mucronate, basally acute to attenuate, 5–10 cm. long, 0.5–3 cm. broad; petioles 0.5–2 cm. long. Inflorescence a panicle of alternate pedunculate ovoid spikes, these occasionally subtended by reduced linear leaves, the rhachises glabrate or puberulent. Flowers perfect, the bracts and bracteoles subequal, broadly ovate, mucronate, concave, entire, transparent, 0.5–1 mm. long, with a conspicuous mass of tawny hairs arising between the bracts and the sepals; sepals 5, subequal, oblong-ovate, acute 3-nerved, 1–1.5 mm. long; stamens 5, united below into a shallow tube with obsolete pseudostaminodia; ovary obovoid; style 1, slightly shorter than the 2 papillose filiform stigmata. Fruit an indehiscent utricle, 0.5–1 mm. long; seeds reddish brown, cochleate-orbiculate, 0.6–0.8 mm. broad.

DARIÉN: Río Sabana, *Leopold 131*; Boca de Cupe, *Williams 670*.

This lochmocolous species extends from Mexico through Central America to Brazil and Ecuador. Standley (in Contr. U. S. Nat. Herb. 27:174. 1928) reports that the name *cadillo*, a name applied to many plants with bur-like fruits, is used on Taboga Island.

4. **Iresine celosia** L. Syst. ed. 10:1291. 1759.

Celosia paniculata L. Sp. Pl. 206. 1753.
Iresine celosioides L. Sp. Pl. ed. 2:1456. 1763.
Iresine diffusa Humb. & Bonpl. in Willd. Sp. Pl. 4:765. 1805.
Iresine elongata Humb. & Bonpl. loc. cit. 765. 1805.
Iresine parviflora HBK. Nov. Gen. & Sp. 2:198. 1818.
Iresine havanensis HBK. loc. cit. 199. 1818.
Iresine mutisii HBK. loc. cit. 200. 1818.
Iresine verticillata Spreng. Syst. 1:821. 1825.
Iresine polymorpha Mart. Nov. Gen. & Sp. 2:56. 1826.
Iresine polymorpha α *alopecuroidea* Mart. loc. cit. 56. 1826.
Iresine polymorpha β *effusa* Mart. loc. cit. 56. 1826.
Iresine polymorpha γ *verticillata* Mart. loc. cit. 56. 1826.
Xerandra celosioides Raf. Fl. Tell. 3:43. 1837.
Iresine floribunda Mart. & Gal. in Bull. Acad. Brux. 101:347. 1843.
Iresine celosioides var. *eriophylla* Benth. Bot. Voy. Sulph. 156. 1844.
Iresine hookeri Moq. in DC. Prodr. 13^2:344. 1849.
Iresine acuminata Moq. loc. cit. 345. 1849.
Iresine celosioides β *pubescens* Moq. loc. cit. 347. 1849.
Iresine eriophylla Moq. loc. cit. 347. 1849.
Iresine gossypiantha A. Rich. in Sagra, Hist. Cuba 11:177. 1850.
Iresine eriophora Peyr. in Linnaea 30:21. 1850.
Alternanthera paniculata Bello, in Anal. Soc. Esp. Hisp. Nat. 12:106. 1883.
Iresine paniculata (L.) O. Ktze. Rev. Gen. 2:542. 1891. not *I. paniculata* Poir.
Achyranthes lanata Sessé & Moc. Fl. Mex. ed. 2:67. 1894. not *A. lanata* L.
Iresine paniculata var. *floridana* Uline & Bray, in Bot. Gaz. 21:353. 1896.

Erect or clambering herbaceous annuals or perennials, to 3 m. high, the younger branches glabrous or pubescent. Leaves herbaceous, glabrate to densely pubescent, ovate, apically acute to attenuate and mucronate, basally rounded to cuneate, 4–15 cm. long, 1–7 cm. broad; petioles 0.5–6 cm. long. Inflorescence a panicle of subsessile filiform to pyramidal spikes, the rhachises glabrate to densely pubescent.

Flowers dioecious; bracts and bracteoles subequal, broadly ovate, mucronate, concave, often auriculate, transparent, 0.5–1 mm. long, with a conspicuous mass of hairs longer than the sepals arising between the bracts and the sepals of the female flowers; stamens 5, united below into an entire or minutely denticulate tube; ovary obovoid; style minute, much shorter than the 2 (–3) filiform stigmata. Fruit an indehiscent utricle 0.5–1 mm. long; seeds reddish brown, cochleate-orbiculate, 0.5–0.6 mm. broad.

BOCAS DEL TORO: Water Valley, vicinity of Chiriquí Lagoon, *von Wedel 1762 & 1849*. CANAL ZONE: Colon to Empire, Panama Railroad, *Crawford 453*; between Mt. Hope and Santa Rita trail, *Cowell 81*; Chagres, Isthmus of Panama, *Fendler 260*; between Summit and Gamboa, *Greenman & Greenman 5235*. CHIRIQUÍ: Potrero Muleto to Summit, Volcán de Chiriquí, 3500–4000 m., *Woodson & Schery 466*; Río Chiriquí to Remedios, 15–50 m., *Woodson, Allen & Seibert 1192*; Finca Lérida to Boquete, ca. 1300–1700 m., *Woodson, Allen & Seibert 1131*; Bajo Mono, mouth of Quebrada Chiquero, along Río Caldera, 155–2000 m., *Woodson, Allen & Seibert 1012*; Río Chiriquí Viejo Valley between El Volcán and Cerro Punta, *G. White 21*; rain forest, Bajo Chorro, Boquete, 6000 ft., *Davidson 320*; Volcán de Chiriquí, Boquete Distr., 8000 ft., *Davidson 932*; vicinity of New Switzerland, central valley of Río Chiriquí Viejo, 1800–2000 m., *Allen 1411*. COCLÉ: no specified locality, *Macbride 2717*. PANAMÁ: Taboga Island, up to 300 m., *Allen 117*; near mouth of R. Chagres, *Allen 875*; hills between Capire and Potrero, *Dodge & Hunter 8645*. PROVINCE UNKNOWN: *Sutton Hayes 722, 928 & 929*.

This species is rather common in the warmer regions of North, Central and South America. Standley & Steyermark (in Field Mus. Bot. 24^4:170. 1946) report that the sap is employed as a remedy for erysipelas around Cobán in Guatemala. Maya names for this plant are *zactezxiu* and *zacxiu*. Other vernacular names reported are *pie de paloma, velo de princesa, adorno de niño, chancanil, tabudo, mosquito, hierba de gato, siete pellejos, coyontura, coyontura de pollo, taba de güegüecho* and *camarón. Iresine spiculigera* Seub. and *Iresine acicularis* Standl. were first lumped by Suessenguth (in Rep. Sp. Nov. 35:319. 1934), but later separated again (in Rep. Sp. Nov. 39:13. 1935). Standley (in Field Mus. Bot. 13^2:517. 1937) apparently accepts the lumping and further states that *I. spiculigera* "is doubtfully distinct from *I. celosia*". Analysis of *I. spiculigera* with cinereous spicular pubescence, *I. acicularis*, with ochraceous spicular pubescence, and *I. frutescens* Moq., with small flowers, reveals that they are best considered conspecific with *I. celosia* L.

9. PHILOXERUS R. Br.

PHILOXERUS R. Br. Prodr. 416. 1810.

Caraxeron Vaill. in Raf. Fl. Tell. 3:38. 1837.
Blutaparon Raf. New Fl. 4:45. 1838.

Flowers perfect, bracteate and bibracteolate, subsessile in spikes. Sepals 5, discrete or basally slightly connate, hypogynous, the outer 3 flat and broader, the inner 2 conduplicate and narrower. Stamens 5, the filaments flattened and united below to form a very shallow tube; pseudostaminodia absent; anthers 2-locellate, introrse, medially attached. Ovary ovoid to orbiculate, 1-locular, 1-ovulate;

ovules on elongate flattened funicles; stigmata 2, on 1 short style, often erect at anthesis and recurving in fruit. Fruit an orbiculate indehiscent utricle; seeds cochleate-orbiculate, reddish brown. Prostrate or decumbent glabrous to pubescent herbaceous perennials. Leaves opposite, entire, often succulent, the sessile bases usually amplexicaul. Inflorescences of terminal and axillary pedunculate congested spikes or glomes often subtended by slightly reduced foliar leaves.

This small genus of two or three species seems to be largely restricted to beaches and salt flats in tropical America and west Africa. Schinz (in Engler & Prantl, Pflanzenf. 16c:83. 1934) has suggested that many Australian species formerly referred to this genus perhaps belong to *Gomphrena.* Only one species reaches North America.

1. **Philoxerus vermicularis** (L.) R. Br. Prodr. 416. 1810.

Gomphrena vermicularis L. Sp. Pl. 224. 1753.
Illecebrum vermiculatum L. Sp. Pl. ed. 2:300. 1762.
Gomphrena aggregata Willd. Enum. 294. 1809.
Philoxerus aggregatus HBK. Nov. Gen. & Sp. 2:203. 1817.
Philoxerus crassifolius HBK. loc. cit. 203. 1817.
Achyranthes vermicularis Ell. Bot. S. C. & Ga. 1:310. 1821.
Gomphrena crassifolia Spreng. Syst. 1:824. 1825.
Caraxeron vermicularis Raf. Fl. Tell. 3:38. 1837.
Blutaparon brevifolium Raf. New. Fl. 4:45. 1838.
Blutaparon repens Raf. loc. cit. 46. 1838.
Iresine vermicularis Moq. in DC. Prodr. 13^2:340. 1849.
Iresine crassifolia Moq. loc. cit. 340. 1849.
Iresine aggregata Moq. loc. cit. 340. 1849.
Cruzeta crassifolia Maza, Fl. Haban. 94. 1897.
Lithophila vermiculata Uline, in Field Mus. Bot. 2:39. 1900.

Prostrate or decumbent perennials, the much branched stems glabrous except at the nodes. Leaves glabrous, succulent, linear to narrowly oblanceolate, apically acute to rounded, often mucronate, basally cuneate, 1–5.5 cm. long, 2–10 mm. broad, the leaf bases encircling the swollen nodes, with an axillary tuft of hairs. Inflorescences of terminal and axillary pedunculate bracteate white to stramineous spikes or glomes, 5–30 mm. long, 5–10 mm. broad, solitary or aggregated, the rhachises villous. Flowers perfect; bracts and bracteoles subequal, ovate, acute to acuminate, concave, translucent, 2–3 mm. long, slightly shorter than or equaling the sepals; sepals 5, the outer 3 almost flat, usually glabrous, apically rounded, 3–4 mm. long, 1–1.5 mm. broad, the inner 2 conduplicate, pubescent, apically acute, 3–4 mm. long, 1 mm. broad; stamens 5, 1–2.5 mm. long, united below into a very shallow or obsolete tube; pseudostaminodia absent; ovary orbiculate to elliptic, style 1, about as long as the 2 papillose stigmata. Fruit an indehiscent utricle, about 2 mm. long; seeds cochleate-orbiculate, reddish brown, 0.8–1.2 mm. broad.

BOCAS DEL TORO: Old Bank Island, vicinity of Chiriquí Lagoon, *von Wedel 1948.*

A rather characteristic sea beach plant, this species ranges from Florida and Texas to Mexico and British Honduras, and from Panama to Brazil in the Americas; it also occurs on the west coast of Africa. As the name implies, the plant

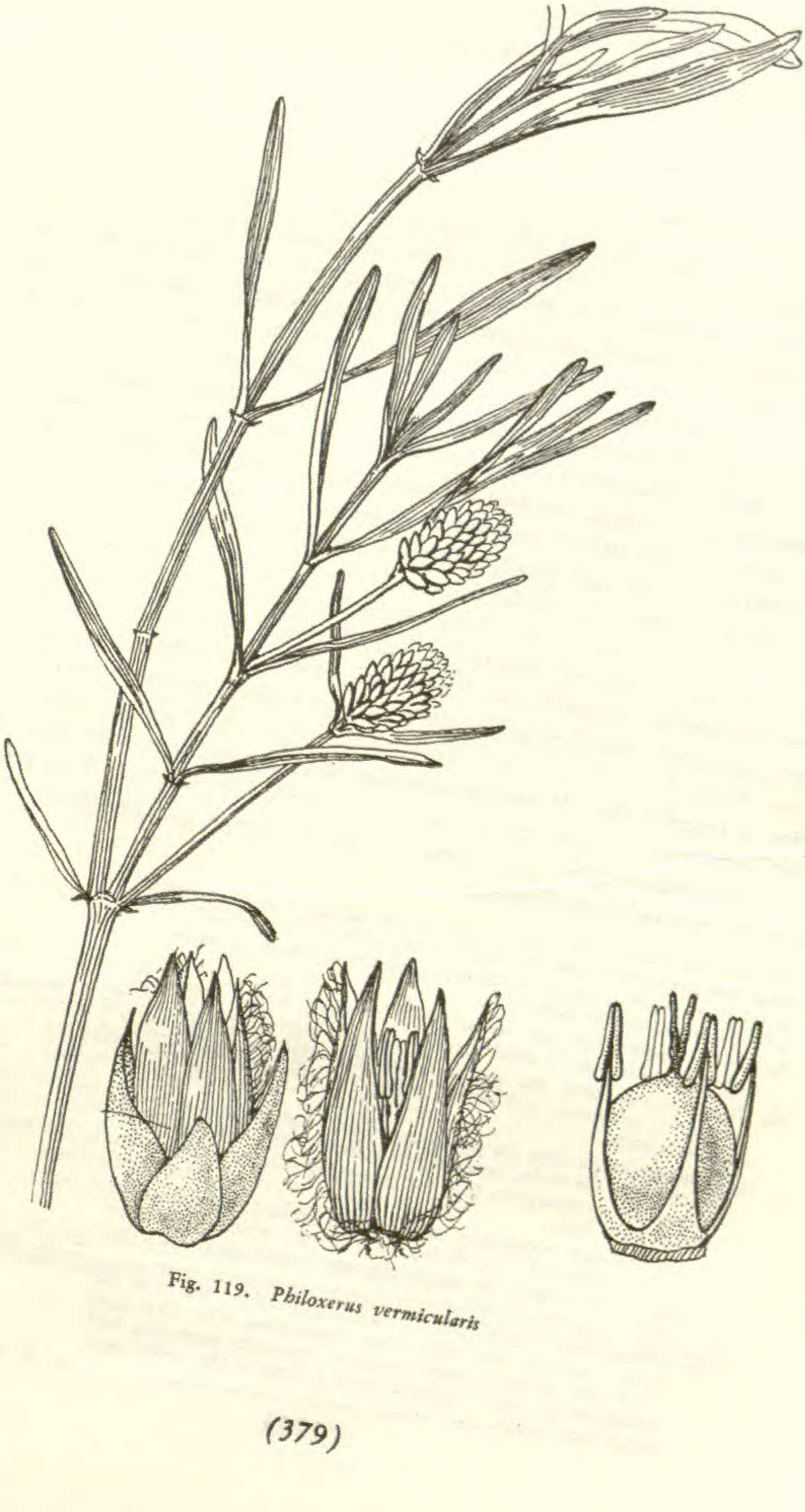

Fig. 119. *Philoxerus vermicularis*

reputedly possesses vermifuge qualities. *P. portulacoides* St.-Hil. differing in having glabrous white sepals, and *P. littoralis* Suesseng., differing in having glabrous white inner sepals and pilose foliar midribs are weakly defined species occurring in South America.

10. ALTERNANTHERA Forskal

Alternanthera Forskal, Fl. Aeg.-Arab. 28. 1775.

Flowers perfect, bracteate and bibracteolate, sessile or subsessile in spikes or glomes. Sepals 5, discrete, hypogynous, concave, subequal or strongly dissimilar, white to purple, the bases often indurate. Stamens 3–5, the filaments flattened and united below into an entire or appendiculate tube; anthers 2-locellate, oblong, introrse, medially attached. Ovary globose to obovoid, often compressed, 1-locular, 1-ovulate; ovule campylotropous on an elongate funicle; stigma 1, capitate or obscurely bilabiate, on a short or elongate style. Fruit a membranaceous utricle, indehiscent; seeds cochleate-orbicular, smooth. Glabrous to copiously pubescent erect, scandent or prostrate annuals or perennials. Leaves opposite, sessile or petiolate, entire to denticulate, glabrous to densely pubescent, mostly herbaceous. Inflorescences of axillary and terminal sessile or pedunculate spikes or glomes.

This genus of over 100 species is best developed in the Americas, although many species are ubiquitous weeds. Some species are cultivated for their ornamental inflorescences and others are planted as tufted border plants and soil binders. *Alternanthera axillaris* Hornem. and *A. repens* (L.) Gmel. are rather obnoxious weeds with pungent sepals. Working under the American Code of nomenclature, Standley (in Jour. Wash. Acad. 5:72. 1915) explains the rather complicated reasons which led him to transfer the *Alternanthera* species to *Achyranthes*, a treatment which he later abandoned. Hitchcock & Green (in Brittonia 6:114. 1947) have proposed that *Alternanthera repens* (L.) Gmel. be the lectotype of the genus. Eleven species are reported from Panama.

a. Inflorescences sessile in the axils of small leaves (mostly 1–4 cm. long); outer and inner sepals strongly dissimilar, the outer 1.5–2 times as broad as the inner (sepals subequal but exceeded by the utricle in *A. sessilis*); prostrate or decumbent herbs.

  b. Utricle longer than the sepals; sepals subequal acute, 1-nerved, glabrous; pubescence of simple hairs.. 1. A. SESSILIS

  bb. Utricle shorter than the sepals; sepals dimorphic or trimorphic, accuminate to aristate, 3–5 nerved, pubescent; pubescence of stellate or septate hairs.

    c. Filaments longer than the pseudostaminodia; stigmata as long as or longer than the styles, attaining or exceeding the anthers; sepals dimorphic or trimorphic; prostrate plants with the leaves often less than 1.5 cm. long.

      d. Inflorescences subglobose to cylindric; sepals dimorphic, the outer 3 subequal with flexible awns if any, whitish; bracteoles 0.2–0.5 as long as the sepals; stigmata longer than the styles; seeds 1–1.2 mm. broad.. 2. A. POLYGONOIDES

      dd. Inflorescences mostly cylindric; sepals trimorphic, with 2 of the outer 3 aristate with rigid awns, stramineous, the third sepal 0.5–1 mm. shorter, merely acuminate; bracteoles more than half as long as the sepals; stigmata about as long as the styles; seeds 1–1.5 mm. broad.. 3. A. REPENS cc. Filaments shorter than the pseudostaminodia; stigmata shorter than the styles, exceeded by the anthers; sepals dimorphic; prostrate or decumbent herbs, the leaves often over 1.5 cm. long.

  e. Leaves apically acute or acuminate, glabrate or sparsely strigose below.......... 4. A. FICOIDEA

  ee. Leaves apically rounded, densely cinereous-pubescent below with stellate hairs.......... 5. A. HALIMIFOLIA

aa. At least some of the inflorescences pedunculate in the axils of larger leaves (mostly 4–10 cm. long); outer and inner sepals subequal; erect or clambering shrubs or decumbent aquatics.

  f. Sepals 5–6 mm. long, 3–4 times as long as the bracts; glomes white, 10–18 mm. broad; peduncles unbranched, mostly less than 5 cm. long; subglabrous herbaceous aquatic plants.......... 6. A. PHILOXEROIDES

  ff. Sepals 2–6 mm. long, no more than twice as long as the bracts; inflorescences white to purple, 4–12 mm. broad; peduncles branched or unbranched, 1–9 cm. long; glabrate to densely pubescent suffruticose terrestrial plants.

    g. Glomes 9–12 mm. broad, if narrower, subsessile; sepals 4–6 mm. long.

      h. Peduncles mostly simple and exceeded by the subtending leaves; leaves ovate, short-strigose or glabrate; sepals short-strigose, the hairs mostly less than 2 mm. long; styles 1–2 times as long as the stigmata; pseudostaminodia almost as long as the sepals.......... 7. A. WILLIAMSII

      hh. Peduncles mostly trichotomously branched and exceeding the subtending leaves; leaves lanceolate, sericeous below; sepals pubescent with long beaded hairs, many of the hairs 3–5 mm. long; styles 2–3 times as long as the stigmata; pseudostaminodia about half as long as the sepals.......... 8. A. LAGUROIDES

    gg. Spikes 4–7 mm. broad, pedunculate; sepals 2–3.5 mm. long.

      i. Leaves linear to linear-elliptic, 2.5–5 cm. long, 3–6 mm. broad; peduncles unbranched; flowers stramineous.......... 9. A. STENOPHYLLA

      ii. Leaves ovate to elliptic, 2.5–10 cm. long, 6–50 mm. broad; peduncle branched or unbranched; flowers white, stramineous or purple.

        j. Peduncles unbranched; flowers white to stramineous; seeds reddish brown; styles about twice as long as the stigmata.......... 10. A. MEXICANA

        jj. Peduncles branched; flowers purplish; seeds reddish brown to black; styles about as long as the stigmata.......... 11. A. PANAMENSIS

1. ALTERNANTHERA SESSILIS (L.) R. Br. Prodr. 417. 1810.

Gomphrena sessilis L. Sp. Pl. 225. 1753.
Illecebrum sessile L. Sp. Pl. ed. 2:300. 1762.
Illecebrum indicum Houtt. Nat. Hist. 2:7. 1777.
Alternanthera triandra Lam. Encycl. 1:95. 1783.
Alternanthera denticulata R. Br. Prodr. 417. 1810.
Alternanthera nodiflora R. Br. loc. cit. 417. 1810.
Allaganthera forskalli Mart. Pl. Hort. Erlang. 69. 1814.
Paronychia sessilis Desf. Tabl. Bot. ed. 2:54. 1815.
Adenogramma oppositifolia Hassk. in Flora 31:754. 1851.
Alternanthera tenuissima Suesseng. in Bot. Arch. 39:382. 1939.

Prostrate or decumbent puberulent or glabrous annuals or perennials, the sparsely branched stems to 60 cm. long. Leaves glabrous or sparsely villous below, elliptic, apically acute and mucronate, basally cuneate to attenuate, 1–4 cm. long, 0.5–1.5 cm. broad; petioles 1–5 mm. long, often winged. Inflorescences of white or pinkish globose heads, 2–4 mm. long, 2–4 mm. broad, sessile in the axils. Flowers perfect, the bracts and bracteoles subequal, acute, 1 mm. long or less; sepals 5, subequal, transparent, not indurate, 1-nerved, slightly concave, 1–1.5 mm. long; stamens 5, united below into a short tube, the pseudostaminodia entire, exceeded by the anthers, about equaling the filaments; ovary obovoid, style 1, 3–4 times as long as the minute capitate stigma. Fruit an indehiscent obcordate yellowish utricle, 1.5–2 mm. long, usually slightly exceeding the sepals; seeds yellowish or reddish brown, cochleate-orbicular, 1–1.2 mm. broad.

This pan-tropical weed seems to range from Honduras to Brazil in the Americas. It inhabits open moist areas and may grow as an aquatic, in which case the vegetative portions are unusually large.

2. ALTERNANTHERA POLYGONOIDES (L.) R. Br. Prodr. 417. 1810.

Gomphrena polygonoides L. Sp. Pl. 225. 1753.
Illecebrum polygonoides L. Sp. Pl. ed. 2:300. 1762.
Achyranthes polygonoides (L.) Lam. Encycl. 1:547. 1785.
Bucholzia polygonoides Mart. Nov. Gen. & Sp. 2:51. 1826.
Alternanthera paronychioides St. Hil. Voy. Distr. Diam. 2:439. 1833.
Steiremis repens Raf. Fl. Tell. 3:41. 1837.
Telanthera polygonoides Moq. in DC. Prodr. 13^2:363. 1849.
Alternanthera ficoidea Griseb. Fl. Brit. W. Ind. 67. 1859. not *Gomphrena ficoidea* L.

Procumbent villous or glabrate perennials, the much branched stems to 80 cm. long. Leaves villous or glabrate, elliptic to ovate or obovate, apically acute to rounded and mucronate, basally cuneate to attenuate, 1–3 cm. long, 0.5–1.5 cm. broad; petioles 2–10 mm. long, often winged and with basal tufts of dentate hairs. Inflorescences of white globose to cylindric heads, 4–10 mm. long, 3–6 mm. broad, sessile in the axils. Flowers perfect, the bracts and bracteoles subequal, acute, ovate, 1–1.5 mm. long; sepals 5, the outer 3 broader, 3-nerved, slightly indurate, pilose below, acuminate, 3–4 mm. long; stamens 5, united below into a short tube, the pseudostaminodia dentate, much exceeded by the anthers; ovary obovoid, style 1, about half as long as the capitate stigma. Fruit an indehiscent obcordate to orbicular utricle, 1–1.5 mm. long; seeds reddish brown, often strongly reticulate, 1–1.2 mm. broad.

This species, occasionally adventive in eastern United States, ranges from Mexico to Argentina in open dry to moist habitats. Standley (in Contr. U. S. Nat. Herb. 27:174. 1928) reports it from Panama but since he keys it as having simple pubescence, the identity of the specimen or specimens is questionable. Backer (in Fl. Mal. 1^4:93. 1949) seems to have lumped this species with *A. ficoidea* (L.) R. Br., but the staminodial differences between the two species appear to be constant. Standley (in Field Mus. Bot. 18:419. 1937) reports the vernacular name *golondrina* in Costa Rica. The South American species *Alternanthera boliviana* Rusby is a very closely allied species, with acute sepals and unusually long spikes.

3. **ALTERNANTHERA REPENS** (L.) Gmel. Linn. Syst. Nat. ed. 13^2:106. 1791.

Achyranthes repens L. Sp. Pl. 205. 1753.
Alternanthera achyranth. Forsk. Fl. Aeg.-Arab. 28. 1755.
Illecebrum achyrantha L. Sp. Pl. ed. 2:299. 1762.
Achyranthes mucronata Lam. Encycl. 1:547. 1785.
Achyranthes radicans Cav. Anal. Ci. Nat. 3:27. 1801.
Paronychia achyrantha Desf. Tabl. Bot. ed. 2:54. 1815.
Pityranthus crassifolius Mart. Denks. Akad. Munch. 5:179. 1817.
Alternanthera villiflora Scheele, in Linnaea 22:149. 1849.
Alternanthera parviflora Fawc. & Rendle, Fl. Jam. 3:139. 1914.

Procumbent villous or glabrate perennials, the much branched stems up to 50 cm. long. Leaves appressed villous or glabrate, ovate to obovate, apically acute to rounded and mucronate, basally rounded to attenuate, 5–25 mm. long, 3–15 mm. broad; petioles 2–10 mm. long, often winged. Inflorescences of yellowish or stramineous usually cylindric heads, 5–12 mm. long, 4–8 mm. broad, sessile in the axils. Flowers perfect, the bracts and bracteoles subequal, 3–4 mm. long; sepals 5, trimorphic, the outer 2 broader, strongly 3-nerved, indurate, pilose below and with rigid awns, the third sepal narrower, shorter and merely acuminate, the inner 2 conduplicate; stamens 5, united below into a shallow tube, the pseudostaminodia entire or dentate, exceeded by the anthers; ovary obovoid, style 1, about as long as the minute capitate stigma. Fruit an indehiscent obcordate utricle, 1.2–1.5 mm. long; seeds reddish brown, 1–1.5 mm. broad, cochleate-orbicular.

Presumably a native of tropical America, this weedy species is now also well established in Asia, Europe and the East Indies. Standley's recount of the distribution (in N. Am. Flora 21:136. 1916) indicates that the species has been collected in Panama. It certainly is to be expected there. In the Yucatan the Mayas apply the name *cabalxtez*; in Guatemala the names *sanguinaria, sacachiquim* and *hierba de toro* are reported. This species is doubtfully distinct from *A. pungens* HBK., which differs in having subrotund leaves and longer less villous sepals.

4. **ALTERNANTHERA FICOIDEA** (L.) R. Br. Prodr. 1:417. 1810.

Gomphrena ficoidea L. Sp. Pl. 225. 1753.
Illecebrum ficoideum L. Sp. Pl. ed. 2:300. 1762.
Paronychia ficoidea Desf. Tabl. Bot. ed. 2:14. 1815.
Bucholzia polygonoides α erecta Mart. Nov. Gen. & Sp. 2:51. 1826.
Bucholzia polygonoides β diffusa Mart. loc. cit. 51. 1826.
Bucholzia polygonoides γ radicans Mart. loc. cit. 51. 1826.
Bucholzia ficoidea Mart. loc. cit. 52. 1826.
Steiremis ficoidea Raf. Fl. Tell. 3:41. 1837.
Teleianthera manillensis Walp. in Nov. Act. Ac. Nat. Cur. 19: suppl. 1:404. 1843.
Telanthera polygonoides α diffusa Moq. in DC. Prodr. 13^2:364. 1849.
Telanthera polygonoides β brachiata Moq. loc. cit. 364. 1849.
Alternanthera polygonoides Griseb. Fl. Brit. W. Ind. 67. 1859. not *Gomphrena polygonoides* L.
Alternanthera polygonoides β glabrescens Griseb. loc. cit. 67. 1859.
Alternanthera versicolor Hort. ex Regel, Gartenfl. 101. 1869.
Alternanthera bettzickianna Nich. Gard. Dict. ed. 1:59. 1884.
Alternanthera amoena Back. & Sloot. Handb. Thee. 108. 1924.

Procumbent or decumbent hispidulous or glabrate perennials, the branching stems to 100 cm. long. Leaves slightly pubescent but soon glabrate, elliptic to broadly ovate or obovate, apically acuminate to acute and mucronate, basally rounded to cuneate, 2–6 cm. long, 0.5–2 cm. wide; petioles 2–10 mm. long, usually winged. Inflorescences of stramineous to white globose to ovoid heads, 3–10 mm. long, 3–6 mm. broad, sessile in the axils. Flowers perfect, bracts and bracteoles subequal, ovate, aristate, 1.5–3 mm. long; sepals 5, the outer 3 broader, 3-ribbed, basally indurate and hispidulous, 3–5 mm. long; stamens 5, united below into a tube, the pseudostaminodia lacerate and exceeding the filaments; ovary obovoid; style 1, 2–3 times as long as the capitate stigma. Fruit an indehiscent suborbicular utricle, 1–1.5 mm. long; seeds reddish brown, cochleate-orbiculate, 0.8–1.2 mm. broad.

CANAL ZONE: vicinity of Monkey Hill, *Cowell 33*; Gatún, *Sutton Hayes 185*; near Culebra, 50–200 m., *Pittier 2289*; Chagres, Isthmus of Panamá, *Fendler 261*; Ancón, *Greenman & Greenman 5018*; low ground, outskirts of Ancón, *Greenman & Greenman 5047*; near Corrosion Laboratory, vicinity of Miraflores Locks, *Stern, Chambers et al. 65*. CHIRIQUÍ: vicinity of San Bartolomé, Peninsula de Burica, 0–50 m., *Woodson & Schery 941*. PROVINCE UNKNOWN: *Sutton Hayes 940*.

The native range of this species is perhaps from Mexico to Argentina, but various forms are cultivated elsewhere as ornamentals and soil binders.

5. ALTERNANTHERA HALIMIFOLIA (Lam.) Standl. in Pittier, Pl. Us. Venez. 145. 1926.

Achyranthes halimifolia Lam. Encycl. 1:547. 1785.
Illecebrum frutescens L'Her. Stirp. Nov. 75. 1788.
Illecebrum limense Dum.-Cours. Bot. Cult. 1:646. 1802.
Paronychia frutescens Desf. Tabl. Bot. ed. 2:54. 1815.
Telanthera crucis Moq. in DC. Prodr. 13^2:362. 1849.
Telanthera frutescens Moq. loc. cit. 365. 1849.
Telanthera frutescens β acutifolia Moq. loc. cit. 366. 1849.
Alternanthera ficoidea γ halimifolia (Lam.) O. Ktze. Rev. Gen. 539. 1891
Telanthera flavogrisea Urban, Symb. Ant. 1:300. 1899.
Alternanthera asterotricha Uline, in Field. Mus. Bot. 1:419. 1899.
Alternanthera flavogrisea Urban, Symb. Ant. 5:340. 1907.
Alternanthera crucis Boldingh, Fl. Dutch W. I. 1:58. 1909.
Telanthera halimifolia A. Stewart, in Proc. Calif. Acad. 4^1:58. 1911
Alternanthera ficoidea var. *flavogrisea* Fawc. & Rendle, Fl. Jam. 3:140. 1914.

Procumbent or decumbent sericeous perennials, the sparingly branched stems to 20 cm. long. Leaves densely pubescent with stellate hairs, rarely glabrate, elliptic to ovate, apically rounded and mucronate, basally rounded to cuneate, 1–5 cm. long, 0.5–2.5 cm. broad; petioles 2–10 mm. long. Inflorescences of stramineous ovoid heads, 4–12 mm. long, 3–5 mm. broad, sessile in the axils. Flowers perfect; bracts and bracteoles subequal, ovate, acuminate to aristate, 1–3 mm. long; sepals 5, the outer 3 broader, 3-ribbed, basally indurate and hispidulous, 3–5 mm. long; stamens 5, united below into a tube, the pseudostaminodia lacerate and exceeding the filaments; ovary globose to obovoid; style 1, about twice as long as the capitate stigma. Fruit an indehiscent globose utricle 1–1.5 mm. long; seeds reddish brown, cochleate-orbicular, 0.8–1.1 mm. broad.

Inhabiting woods, thickets, pond borders and sea beaches, mostly at low elevations, this species extends from Mexico and the West Indies to Colombia, Chile and the Galapagos Islands. Standley (in N. Am. Flora 21:140. 1917) indicates that it occurs in Panama. The obvious silvery pubescence usually separates this from the preceding species with which it reputedly intergrades.

6. ALTERNANTHERA PHILOXEROIDES (Mart.) Griseb. Abh. Ges. Wiss. Gött. 24: 36. 1879.

Bucholzia philoxeroides Mart. Nova Acta Acad. Leop.-Carol. 13^1:315. 1826.
Telanthera philoxeroides Moq. in DC. Prodr. 13^2:362. 1849.
Telanthera philoxeroides α obtusifolia Moq. loc. cit. 363. 1849.
Telanthera philoxeroides β acutifolia Moq. loc. cit. 363. 1849.
Telanthera philoxeroides var. *δ phyllantha* Seub. in Mart. Fl. Bras. 5^1;169. 1875.
Telanthera philoxeroides var. *γ denticulata* Seub. loc. cit. 170. 1875.
Achyranthes philoxeroides (Mart.) Standl. in Jour. Wash. Acad. Sci. 5:74. 1915.

Decumbent or ascending glabrate aquatic perennials, the simple or branched, often fistulose stems to 100 cm. long. Leaves glabrous or glabrate, lanceolate to narrowly obovate, apically rounded to acute, basally cuneate, rarely denticulate, 2–10 cm. long, 0.5–2 cm. broad; petioles 1–3 mm. long. Inflorescences of terminal and occasionally axillary white glomes, 10–18 mm. long, 10–18 mm. broad, the usually unbranched peduncles 1–5 cm. long. Flowers perfect, bracts and bracteoles subequal, ovate, acuminate, 1–2 mm. long; sepals 5, subequal, oblong, apically acute and occasionally denticulate, neither indurate nor ribbed, 5–6 mm. long, 1.5–2.5 mm. broad; stamens 5, united below into a tube, the pseudostaminodia lacerate and exceeding the anthers; ovary reniform, the style about twice as long as the globose capitate stigma. Fruit an indehiscent reniform utricle 1 mm. long, 1–1.5 mm. broad; mature seeds not seen.

Standley (in N. Am. Fl. 21:142. 1917) gives the range of this species as from Colombia to Brazil and Argentina, adventive in the southeastern United States. I have seen no specimens from Panama but it could easily be adventive there. Suessenguth (in Rep. Spec. Nov. 39:4. 1935) reports a teratological specimen from Pearl Islands in San José in which the stamens are replaced by carpels.

7. ALTERNANTHERA WILLIAMSII (Standl.) Standl. in Jour. Wash. Acad. Sci. 15: 458. 1925.

Achyranthes williamsii Standl. in Contr. U. S. Nat. Herb. 18:89. 1916.

Erect or clambering pubescent perennials, the sparingly branched stems to 5 m. long. Leaves appressed pubescent, sometimes variegated with purple, ovate, apically acute to acuminate, basally rounded to acute, 2.5–10 cm. long, 1–4 cm. broad; petioles 2–8 mm. long. Inflorescences of terminal and axillary white to stramineous, globose to ovoid heads, 10–30 mm. long, 10–12 mm. broad, the usually unbranched peduncles 1–7 cm. long. Flowers perfect; bracts and bracteoles subequal, ovate, carinate, aristate, 2–4 mm. long; sepals 5, subequal, oblong, 3-ribbed and indurate basally, 4–6 mm. long, 1–1.5 mm. broad; stamens 5, united below into a tube, the pseudostaminodia lacerate and exceeding the anthers; ovary globose; style 1, 1–2 times as long as the globose stigma. Fruit an indehiscent obovoid utricle, the seeds reddish brown, cochleate-orbicular, 1.2–1.5 mm. long.

CANAL ZONE: between Summit and Gamboa, *Greenman & Greenman 5244*. COLÓN: Ahorca Lagarto, *Cowell 255*. DARIÉN: vicinity Yape, Río Tuira, *Allen 4302*; Tucuti, Chepigana, *Terry & Terry 1388*; Cituro, *Williams 675*. PROVINCE UNKNOWN: *Sutton Hayes 949*; *Halsted in 1850*.

An inhabitant of dry thickets, this species ranges from Panama to southern Mexico. It is very closely related to the Mexican species *A. gracilis* (Mart. & Gal.) Standl. which supposedly differs in having globose heads, recurved sepals, trichotomous peduncles and black seeds. Intermediate forms do occur however. *A. williamsii* f. *purpurea* Standl., with purplish red leaves, is cultivated in the Canal Zone as an ornamental.

8. ALTERNANTHERA LAGUROIDES (Standl.) Standl. in Standl. & Cald. Lista Pl. Salvador 74. 1925.

Achyranthes laguroides Standl. in Contr. U. S. Nat. Herb. 18:90. 1916.

Erect or clambering pubescent perennials, the much branched stems to 4 m. long. Leaves densely sericeous, especially below, lanceolate to narrowly ovate, apically attenuate, basally attenuate, 2–10 cm. long, 1–3.5 cm. wide; petioles 1–4 mm. long. Inflorescences of terminal and axillary stramineous to whitish ovoid heads, 5–15 mm. long, 4–12 mm. broad, the peduncles to 9 cm. long, branched or unbranched, naked or leafy (when leafy, the heads may appear sessile). Flowers perfect; bracts and bracteoles subequal, ovate, acuminate to aristate, 2–3.5 mm. long; sepals 5, narrowly oblong, 1–3 nerved, scarcely indurate, 4–5.5 mm. long, with basal hairs almost exceeding the sepals; stamens 5, united below into a tube, the lacerate pseudostaminodia exceeding the anthers; ovary obovoid to globose; style 1, 2–3 times as long as the globose stigma. Fruit an obovoid utricle to 1 mm. long; mature seeds not seen.

According to Standley & Steyermark (in Field Mus. Bot. 24:149. 1946) this species ranges from Guatemala to Panama in dry thickets of the Pacific slope. In Guatemala it is called *botoncito*. Possibly Moquin was using this species in his description of *Telanthera pubiflora* α *monocephala*, the type of which was collected in Panama. I have not seen the type, but believe the description fits *A. laguroides* more closely than any of the other Central American species.

9. ALTERNANTHERA STENOPHYLLA (Standl.) Standl. in Field Mus. Bot. 8:9. 1930.

Achyranthes stenophylla Standl. in Contr. U. S. Nat. Herb. 18:90. 1916.

Ascending or erect sparsely strigose or glabrate perennials. Leaves sparsely pilose or glabrate, linear to linear-elliptic, apically acute, basally acuminate, 2.5–5 cm. long, 3–6 mm. broad; petioles 2–6 mm. long. Inflorescences of axillary and terminal stramineous cylindric heads, 6–10 mm. long, 5–6 mm. broad; peduncles unbranched, 2–5 cm. long. Flowers perfect, the bracts and bracteoles subequal, ovate, aristate, 1–2 mm. long; sepals 5, oblong, obscurely 3-nerved and indurate basally, 2–2.5 mm. long; stamens 5, united below into a tube, the lacerate pseudostaminodia exceeding the anthers; ovary subglobose; style 1, 2–3 times as long as the globose stigma. Mature fruit not seen.

PROVINCE UNKNOWN: *Sutton Hayes 941.*

The type for this species was collected by Sutton Hayes in the year 1859-1860 and the only given locality was Panama. Apparently it is known only from the type collection. Except for the linear leaves, this species very strongly resembles the following species.

10. ALTERNANTHERA MEXICANA (Schlecht.) Hieron. Bot. Jahrb. 20: Beibl. 49:8. 1895.

Brandesia mexicana Schlecht. in Linnaea 7:392. 1832.
Telanthera microcephala Moq. in DC. Prodr. 13^2:371. 1849.
Telanthera mexicana Moq. loc. cit. 372. 1849.
Alternanthera lehmannii Hieron. in Bot. Jahrb. 20: Beibl. 49:8. 1895.
Achyranthes lehmannii (Hieron.) Standl. in Jour. Wash. Acad. 5:74. 1915.
Achyranthes mexicana (Schlecht.) Standl. loc. cit. 74. 1915.

Ascending or erect pilose or glabrate perennials, the scantily branched stems to 1 m. long. Leaves appressed pilose or glabrate, elliptic to ovate, apically attenuate, basally acute to cuneate, 2.5–10 cm. long, 1–5 cm. broad; petioles 2–15 mm. long. Inflorescences of axillary and terminal white to stramineous subglobose to cylindric heads, 5–10 mm. long, 4–7 mm. broad; peduncles mostly unbranched, to 9 cm. long. Flowers perfect, the bracts and bracteoles subequal, ovate, acuminate to aristate, 1–2 mm. long; sepals 5, oblong, obscurely 3-nerved and slightly indurate basally, 2–3.5 mm. long, 1 mm. broad; stamens 5, united below into a tube, the lacerate pseudostaminodia exceeding the filaments; ovary globose to obovoid; style 1, about twice as long as the globose stigma. Fruit an indehiscent obovoid utricle, 1–1.5 mm. long; seeds reddish brown, cochleate-orbiculate, about 1 mm. broad.

PROVINCE UNKNOWN: *Sutton Hayes 945.*

Inhabiting mesic forests, this species extends from Mexico south locally to Colombia. It is of more than casual interest that *Sutton Hayes 945* is *A. mexicana*, *Sutton Hayes 944* is the type of *A. panamensis* and *Sutton Hayes 941* is the type of *A. stenophylla.* The flowers of all these specimens are very similar indeed and would suggest that the latter two were mere vegetative variants of *A. mexicana.*

11. ALTERNANTHERA PANAMENSIS (Standl.) Standl. in Field Mus. Bot. 8:9. 1930.

Achyranthes panamensis Standl. in Contr. U. S. Nat. Herb. 18:89. 1916.

Erect or clambering pilose perennials, the stems much branched. Leaves appressed pilose, ovate to elliptic, apically acute to acuminate, basally subacute, 2–5.5 cm. long, 0.5–2 cm. wide; petioles 1–4 mm. long. Inflorescences of terminal and axillary stramineous to purplish globose to cylindric heads, 7–11 mm. long, about 7 mm. broad; peduncles mostly branched, 1–6 cm. long, villous.

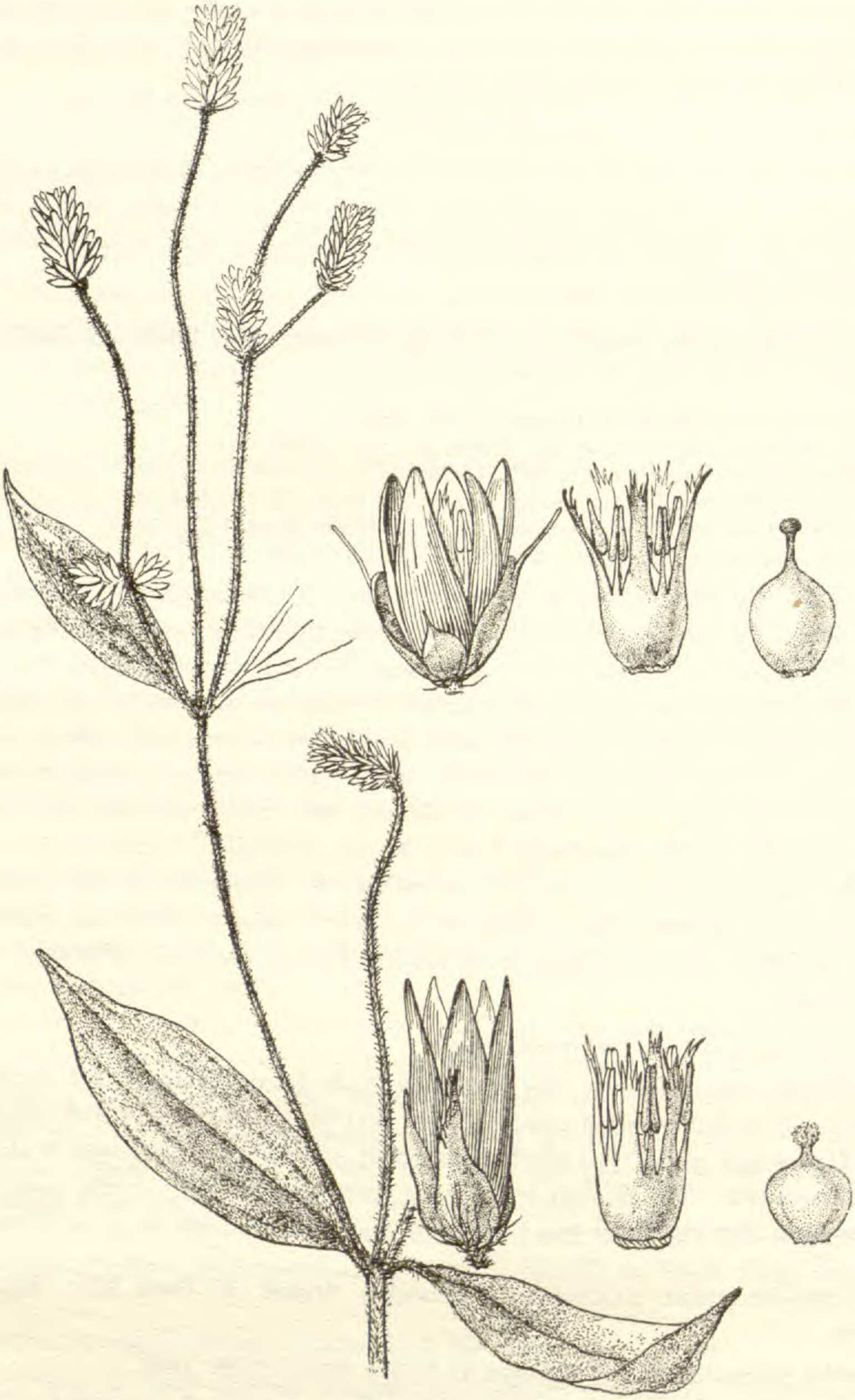

Fig. 120. *Alternanthera panamensis* (habit and lower details) and *A. mexicana* (upper details)

Flowers perfect; bracts and bracteoles subequal, ovate, acuminate to aristate, 1–2 mm. long; sepals 5, oblong, strongly 3-nerved and indurate below, 2.5–3.5 mm. long; stamens 5, united below into a tube, the lacerate pseudostaminodia exceeding the filaments; ovary obovoid to subglobose; style 1, about as long as the globose stigma. Fruit an indehiscent subglobose utricle; seeds dark reddish brown to black, cochleate-orbiculate, 1 mm. broad.

PROVINCE UNKNOWN: *Sutton Hayes 944*.

This species, represented solely by the type collection, is perhaps just a casual variant of *A. mexicana* (Schlecht.) Hieron. It seems to bear the same relation to *A. mexicana* that the branched-pedunculate *A. gracilis* (Mart. & Gal.) Standl. bears to the unbranched-pedunculate *A. williamsii* (Standl.) Standl.

11. GOMPHRENA L.

GOMPHRENA L. Sp. Pl. 224. 1753.

Coluppa Adans. Fam. Fl. 2:268. 1763.
Bragantia Vand. Fasc. Pl. Nov. 6. 1771.
Wadapus Raf. Fl. Tell. 3:77. 1837.
Xerosiphon Turcz. in Bull. Soc. Nat. Mosc. 16:55. 1843.
Xeraea O. Ktze. Rev. Gen. 545. 1891.
Amarantoides Maza, Fl. Haban. 94. 1897.

Flowers perfect, bracteate and bibracteolate, sessile in spikes or heads. Sepals 5, basally connate or discrete, hypogynous, concave, subequal, colorless or brightly colored. Stamens 5, hypogynous, the filaments connate forming a deep stamen tube, the anthers sessile at the summit of the tube; pseudostaminodia 2-lobate; anthers 2-locellate, introrse, medially attached. Ovary globose to obovoid, 1-locular, 1-ovulate, the ovule campylotropous on an elongate flattened funicle; style 1, filiform, about as long as the 2 filiform stigmata. Fruit an indehiscent utricle; seeds cochleate-orbiculate. Pubescent erect or decumbent annual or perennial herbs. Leaves opposite, sessile or petiolate, entire, usually pubescent, apparently deciduous. Inflorescences of terminal and occasionally axillary globose to cylindric solitary or clustered heads, usually subtended by foliar leaves.

This genus of nearly a hundred species, with some native to tropical America and others to tropical Austral-Asia, seem to reach its best development in South America. Several species are widely cultivated, as is the "bachelor's button", *G. globosa*, a rather handsome ornamental with edible leaves. Four species are known from Central America but only two are reported from Panama.

a. Heads 5–14 mm. in diameter; bracteoles 4–6 mm. long; leaves 1–5 cm. long .... 1. G. DECUMBENS
aa. Heads 15–25 mm. in diameter; bracteoles 7–12 mm. long; leaves 2–10 cm. long .... 2. G. GLOBOSA

1. GOMPHRENA DECUMBENS Jacq. Hort. Schoenbr. 4:41. 1804.

Xeraea decumbens O. Ktze. Rev. Gen. 545. 1891.
Gomphrena decumbens f. *albiflora* Chod. & Hassl. in Bull. Herb. Boiss. 2^3:389. 1903.
Gomphrena decumbens f. *roseiflora* Chod. & Hassl. loc. cit. 389. 1903.

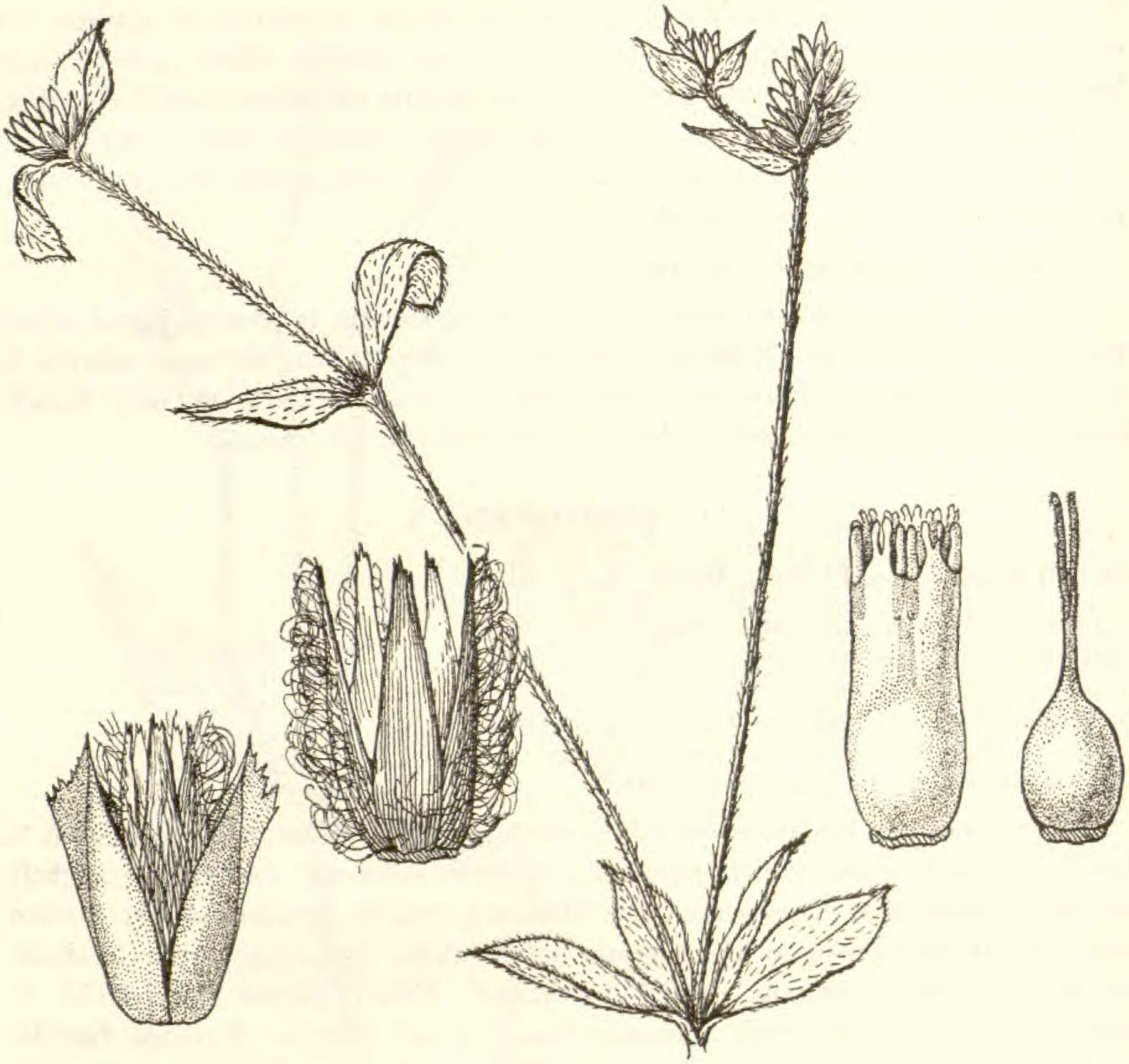

Fig. 121. *Gomphrena decumbens*

Gomphrena ixiamensis Rusby, in Bull. N. Y. Bot. Gard. 6:502. 1910.
Gomphrena decumbens var. *genuina* Stuchlík, in Rep. Spec. Nov. 11:156. 1912.
Gomphrena decumbens var. *grandifolia* Stuchlík, loc. cit. 157. 1912.
Gomphrena perennis subsp. *pseudodecumbens* Stuchlík, loc. cit. 153. 1912.
Gomphrena perennis f. *simplex* Stuchlík, loc. cit. 153. 1912.
Gomphrena dispersa Standl. in Contr. U. S. Nat. Herb. 18:91. 1916.
Gomphrena decumbens var. *carinata* Suesseng. in Rep. Sp. Nov. 39:8. 1935.

Prostrate or decumbent pilose annual or perennial herbs, the much branching stems to 50 cm. long, often rooting at the nodes and forming mats. Leaves sericeous to strigose, occasionally glabrate, oblong to ovate or obovate, apically acute to rounded and mucronate, basally acute to attenuate, 1–5 cm. long, 0.5–2.5 cm. broad; petioles 1–5 mm. long. Inflorescences of terminal and axillary ovoid to cylindric whitish or purplish heads, occasionally clustered, 4–20 mm. long, 5–14 mm. broad, subtended by ovate leaves 0.5–2 cm. long. Flowers perfect; bracts persistent, ovate, acuminate, 1.5–3 mm. long; bracteoles narrowly to broadly cristate, equaling or exceeding the sepals, 4–6 mm. long; sepals 5, subequal, basally connate, cinereous- to rufous-lanate, ultimately indurate and closely embracing the fruit; stamens 5, subequal, the anthers sessile between the 5 2-lobate pseudostaminodia; stamen tube 3–6 mm. long; ovary globose; style 1, 1–1.5 mm. long; stigmata 2, 1–1.5 mm. long. Fruit an indehiscent areolate utricle 1–2 mm. long; seeds cochleate-orbiculate, yellowish to reddish brown, ocellate, 1.5–1.7 mm. broad.

BOCAS DEL TORO: Research grounds, region of Almirante, *Cooper 138*. CANAL ZONE: open sunny area next to road, Corrosion Laboratory, vicinity of Miraflores Locks, *Stern, Chambers et al. 68*; Ancón, *Greenman & Greenman 5015*; vicinity of Miraflores Lake, *White & White 192*; Pedro Miguel, *Bro. Heriberto 19*. CHIRIQUÍ: vicinity of Puerto Armuelles, 0–75 m., *Woodson & Schery 819*.

This species ranges from the West Indies and Mexico to Panama and from Brazil and Bolivia to Argentina. Common names in Guatemala are *botoncillo, sangrinaria, sanguinaria, siempreviva* and *siempreviva de monte*; other names in the Yucatan and adjoining regions are *chacmol, tmuul, amor seco* and *secicante.* Standley (in Contr. U. S. Nat. Herb. 18:91. 1916) has separated a variant, with the crests of the bracteoles conspicuously widest at the apex, as *G. dispersa,* which seems to occur throughout the range of *G. decumbens.* No correlated differences exist and transitions occur, so *G. dispersa* is reduced to synonymy. As Suessenguth (in Rep. Spec. Nov. 39:8. 1935) has noted *Greenman & Greenman 5015* is intermediate between *G. decumbens* and *G. nitida* Rothr., a questionably distinct species supposed to differ in having lacinate-dentate crests, larger rarely purple heads and an erect habit. *Palmer 401* from Mexico has crests both dentate and laciniate-dentate, or even absent; the specimen also has both included and exserted stamen tubes. This particularly illuminating example serves to demonstrate that *G. nitida* is hardly more deserving of specific status than is *G. dispersa.*

2. GOMPHRENA GLOBOSA L. Sp. Pl. 224. 1753.

Gomphrena globosa β carnea Moq. in DC. Prodr. 13^2:409. 1849.
Gomphrena globosa γ albiflora Moq. loc. cit. 409. 1849.
Xeraea globosa O. Ktze. Rev. Gen. 545. 1891.
Amarantoides globosus Maza, Fl. Haban. 94. 1897.
Amarantoides globosus albiflorus Maza, loc. cit. 95. 1897.
Gomphrena globosa var. *aureiflora* Stuchlík, in Rep. Spec. Nov. 12:340. 1913.

Erect or ascending pilose annual herbs, the branching stems to 60 cm. high. Leaves sericeous, occasionally glabrate, oblong to ovate or obovate, apically acute and mucronate, basally rounded to attenuate, 2–10 cm. long, 0.5–5 cm. broad; petioles 1–15 mm. long. Inflorescences of terminal and axillary reniform to cylindric variously colored heads or spikes, occasionally clustered, 10–25 mm. long, 15–25 mm. broad, subtended by ovate leaves 5–20 mm. long. Flowers perfect; bracts persistent, ovate, acuminate, 3–4 mm. long; bracteoles dentate-cristate, exceeding the sepals, 7–12 mm. long, 2–3.5 mm. broad; sepals 5, subequal, basally connate, cinereous- to rufous-lanate, ultimately indurate and closely embracing the fruit, 5–6.5 mm. long; stamens 5, the anthers sessile between the 5 2-lobate pseudostaminodia; stamen tube 4–8 mm. long; ovary globose; style 1, 1–1.5 mm. long; stigmata 2, 1–1.5 mm. long. Fruit an indehiscent areolate utricle 1.5–2.5 mm. long; seeds cochleate-orbiculate, reddish brown, ocellate, 1.5–2 mm. broad.

Cultivated and escaped in many regions of the world, this species may be a native of America although it was originally described from India. Standley (in Contr. U. S. Nat. Herb. 27:173. 1928) reports that it occurs in Panama as a cultivant and an escape. In Panama it is called *siempreviva* and *suspiro.* The names *amor seco, inmortal* and *botón* are also used in Guatemala. Some of these vernacular names suggest the persistence of the flowerss which makes them popular in wreaths and dry floral arrangements. That the differences between this and the preceding species are quantitative may suggest a polyploid derivation.

NYCTAGINACEAE*

Herbs, shrubs, or trees, sometimes scandent, the stems frequently swollen at the nodes, particularly in the herbaceous genera, and sometimes armed with axillary spines. Leaves alternate, opposite, whorled, or approximate, simple, estipulate, entire. Flowers monochlamydeous, perfect or unisexual, in various cymose inflorescences, occasionally solitary, the bracteoles often enlarged and involucrate, herbaceous or petalaceous and enclosing one or more flowers. Perianth monochlamydeous, herbaceous or petalaceous, tubular to infundibuliform, campanulate, urceolate, or salverform, involute-plicate in aestivation, the base of the tube persistent in fruit, the limb persistent or deciduous. Stamens 1 to many, hypogynous, the filaments unequal, usually united at the base, the anthers included or exserted, dorsifixed near the base. Ovary 1-celled, containing a solitary basal ovule; style elongate, short, or lacking. Fruit a fleshy, coriaceous, or woody anthocarp, occasionally bearing viscid stipitate glands.

Nyctaginaceae are an essentially tropical and subtropical family, particularly in the New World. The Four-o'clock Family is represented in Panama by five indigenous genera, but more familiar to the general public are the introduced genera *Bougainvillea* and *Mirabilis*. *Bougainvillea,* almost ubiquitously planted as an ornamental woody vine because of its handsome clusters of three showy magenta, red, pink, white, or yellow bracts subtending the inconspicuous flowers, is a South American genus which does not appear to naturalize readily in Panama. The plants variously are referred to *B. glabra* Choisy and *B. spectabilis* Willd. It usually is known by its Latin name, or by the vernacular *veranera* and *flor de verano* because of its habit of blooming in the dry season. *Mirabilis jalapa* L., the common four-o'clock of the English, is a herb with showy red, white, yellow, or variegated flowers set in individual green calyx-like involucres. It is cultivated in gardens and escapes as a vigorous weed in waste ground and roadsides. It is known locally as *maravilla* and *buenas tardes* because of its vespertine blooms.

The taxonomy of the Nyctaginaceae, particularly of the woody dioecious genera, is very confused. It seems entirely possible that interspecific hybridization may be one factor responsible for obscuring the lines of the species. The species bibliographies which follow are frankly provisional; to some, additional synonyms will have to be added from the South American literature and some such names possibly will have to take precedence over the Central American which are adopted here. The detailed study essential to a competent treatment unfortunately is beyond the scope of this flora.

A. Herbs; flowers bisexual.. 1. BOERHAVIA

AA. Trees, shrubs, and woody lianas; flowers unisexual, dioecious.

  B. Staminate flowers with deeply included stamens; pistillate flowers with the ovary sessile and free from the staminodes; bracteoles borne immediately beneath the perianths; plants unarmed.

    C. Stamens 25–30; staminate perianths broadly campanulate; anthocarps woody, not glandular, the perianth limb persistent. 2. CEPHALOTOMANDRA

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* With the collaboration of Harold J. Kidd.

CC. Stamens 5–10, usually 8; staminate perianths tubular to urceolate; anthocarps fleshy, the perianth limb withering and at length abscissing.......... 3. Neea

BB. Staminate flowers campanulate, with widely exserted stamens; pistillate flowers with the ovary stipitate.

C. Plants unarmed; anthocarps fleshy, not glandular, the perianth limb persistent; bracteoles borne immediately beneath the perianths; pistillate flowers with the staminodes about as long as the ovary and bearing conspicuous sterile anthers.......... 4. Guapira

CC. Plants usually armed with stout axillary spines; anthocarps coriaceous, armed with conspicuous stipitate glands; bracteoles not borne immediately beneath the perianths; pistillate flowers with the staminodes reduced to a low, occasionally minutely glandular-dentate disc.......... 5. Pisonia

1. BOERHAVIA L.

Boerhavia L. Sp. Pl. 3. 1753.

Boheravia Parodi, in Anal. Soc. Cient. Argent. 5:210. 1878.
Boerhaavia auct.

Annual or perennial herbs. Leaves opposite or subopposite, petiolate, frequently unequal at the nodes, the blade undulate or sinuate, conspicuously raphidulous. Inflorescence terminal, paniculiform to racemiform, many-flowered. Flowers small, perfect, subtended by 1–3 minute bracteoles, the perianth tube persistent, more or less herbaceous, frequently glandular, the perianth limb deciduous, petalaceous, obscurely 5-lobed; stamens 1–5, included or exserted; ovary shortly stipitate, the stigma capitate, more or less exserted. Anthocarp obpyramidal to obovoid or subellipsoid, glabrous to glandular, 3- to 5-angulate.

Numerous species in the tropics and subtropics of both hemispheres. Both species in Panama are weeds and possibly not indigenous.

a. Annuals; stems erect or ascending, glabrous or essentially so; leaves reddish-punctate beneath; inflorescences not leafy, the flowers in 2- to 3-flowered dichasia, distinctly pedicellate; anthocarps obpyramidal, truncate, glabrous, conspicuously pedicellate.......... 1. B. erecta

aa. Perennials; stems decumbent, more or less glabrous; leaves not punctate beneath; inflorescences leafy-bracted, the flowers in small glomerulate clusters, sessile or subsessile; anthocarps obovoid to subellipsoid, obtuse or somewhat beaked, glandular, sessile or subsessile.......... 2. B. diffusa

1. Boerhavia erecta L. Sp. 3. 1753.

Boerhavia elongata Salisb. Prodr. 56. 1796.
Boerhaavia virgata HBK. Nov. Gen. 2:215. 1817.
Boerhaavia discolor HBK. loc. cit. 1817.
Boerhaavia atomaria Raf. Aut. Bot. 40. 1840.
Valeriana latifolia Mart. & Gal. in Bull. Acad. Brux. 11^1:124. 1844.
Boerhaavia paniculata β subacuta Choisy, in DC. Prodr. 13^2:451. 1849.
Boerhavia thornberi M. E. Jones, Contr. West. Bot. 12:72. 1908.
Boerhaavia erecta thornberi (M. E. Jones) Standl. in Contr. U. S. Nat. Herb. 12:381. 1909.

Annual herbs; stems erect or ascending, 2–8 dm. tall, rather slender, glabrous or essentially so. Leaves opposite or subopposite, often unequal at the nodes, petiolate; blade rather irregularly ovate-rhombic, obtuse to rounded, or infrequently

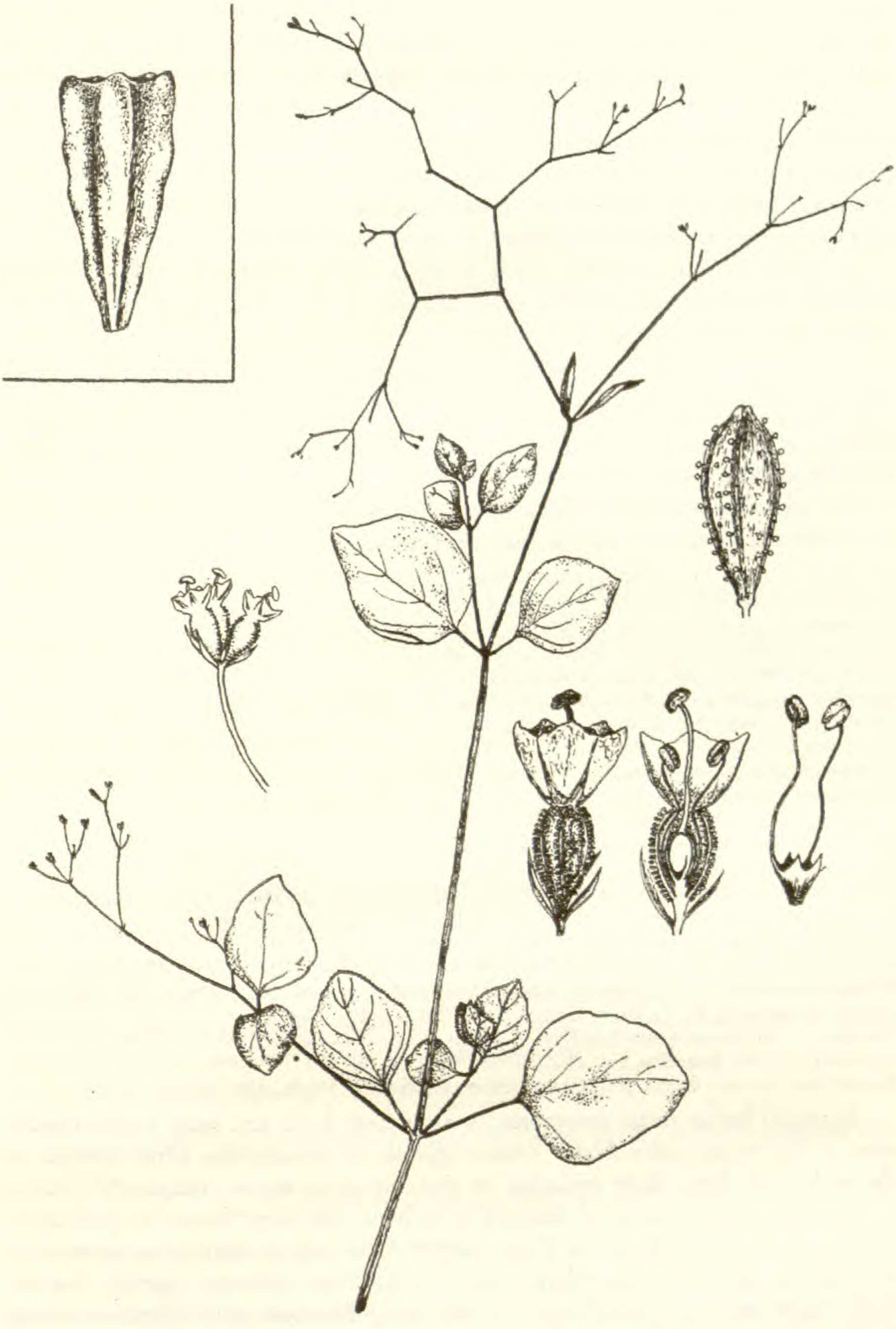

Fig. 122. *Boerhavia diffusa*; insert: fruit of *B. erecta*

acute, at the apex, broadly obtuse to rounded at the base, undulate or sinuate, 2–9 cm. long, 1–4 cm. broad, glabrous or essentially so, yellowish green above, paler and more or less conspicuously bracteate, glabrous or essentially so. Flowers in pedunculate 2- to 3-flowered dichasia, distinctly pedicellate, the perianth tube 1.0–1.5 mm. long, about 0.5 mm. broad, herbaceous, glabrous, the perianth limb campanulate, about 0.5–0.7 mm. long, white or pink; stamens 2–3, slightly exserted. Anthocarps obpyramidal, truncate, glabrous, 3–4 mm. long, 1.0–1.5 mm. broad, borne upon accrescent pedicels of about equal length.

A small weed of beaches, open thickets, fields, roadsides, and wasteland; southern United States, Antilles, Central and South America; a rare sporadic ruderal in tropical Africa.

CANAL ZONE: Gamboa, *Bro. Heriberto 28, Standley 28461*; Monte Lirio, *Maxon 6860*; Obispo, *Standley 31775*; Gatún, *Cowell 296*; Frijoles, *Piper 5829*; New Frijoles, *Pittier 6836*; Balboa, *Bro. Celestine 10*; Paraíso, *Pittier 2529*; Summit, *Standley 30133*; Monkey Hill, *Cowell 28*. CHIRIQUÍ: Puerto Armuelles, *Woodson & Schery 838*. COLÓN: Colón, *Macbride & Featherstone 1, Piper 5892, Rose 22084*.

The glabrous anthocarps and inflorescences of *B. erecta* have made this species less widely dispersed as a ruderal than *B. diffusa*.

2. BOERHAVIA DIFFUSA L. Sp. Pl. 3. 1753.

Boerhaavia coccinea Mill. Gard. Dict. ed. 8. Boerhaavia no. 4. 1768.
Boerhavia caribaea Jacq. Obs. Bot. 4:5. *tab. 84.* 1771.
Boerhavia diandra Aubl. Hist. Pl. Guian. 1:4. 1775.
Boerhaavia paniculata A. Rich. Act. Soc. Hist. Nat. Paris 1:105. 1792.
Boerhaavia polymorpha A. Rich. loc. cit. 185. 1792.
Boerhavia hirsuta Willd. Phytog. 1:1. 1794.
Boerhaavia adscendens Willd. Sp. Pl. 1:19. 1798.
Boerhaavia viscosa Lag. & Rodr. in Anal. Ci. Nat. 4:256. 1801.
Boerhaavia decumbens Vahl, Enum. Pl. 1:284. 1805.
Boerhaavia laxa Pers. Syn. Pl. 1:36. 1805.
Boerhavia squamata Raf. Aut. Bot. 40. 1840.
Boerhaavia sonorae Rose, in Contr. U. S. Nat. Herb. 1:111. 1891.
Boerhaavia diffusa var. *hirsuta* (Jacq.) O. Ktze. Rev. Gen. 533. 1891.
Boerhaavia diffusa var. *paniculata* (Rich.) O. Ktze. loc. cit. 1891.
Boerhaavia diffusa var. *viscosa* (Lag. & Rodr.) Heimerl, Beitr. Syst. Nyct. 27. 1897.
Boerhaavia viscosa forma *oligadena* Heimerl, in Ann. Cons. Jard. Genève 5:189. 1901.
Boerhavia ramulosa M. E. Jones, Contr. West. Bot. 10:40. 1902.
Boerhaavia viscosa apiculata Standley, in Contr. U. S. Nat. Herb. 12:383. 1909.
Boerhaavia ixodes Standley, loc. cit. 13:423. 1911.
Boerhaavia coccinea forma *parcehirsuta* Heimerl, in Urb. Symb. Ant. 7:212. 1912.

Perennial herbs; stems decumbent to ascending, 4–12 dm. long, rather slender, more or less viscid-puberulent. Leaves opposite or subopposite, often unequal at the nodes, petiolate; blade orbicular to rhombic-ovate below, frequently grading to lanceolate above, obtuse to rounded or acute at the apex, obtuse to rounded at the base, undulate or sinuate, 2–6 cm. long, 2–5 cm. broad, more or less puberulent to glabrate, yellowish green above, paler beneath, not punctate; petiole 1–4 cm. long. Inflorescences paniculiform, lax and many-flowered, leafy-bracteate at least below, viscid-puberulent to glabrate. Flowers in pedunculate glomerulate clusters, sessile or subsessile, the perianth tube 0.7–1.0 mm. long, somewhat less than 0.5

mm. broad, herbaceous, minutely glandular, the perianth limb campanulate, about 0.5 mm. long, red to purple, rarely white; stamens 3, slightly exserted. Anthocarps obovoid to subellipsoid, obtuse to obscurely beaked, 3–4 mm. long, 1 mm. broad, glandular, sessile or subsessile.

A weed widely dispersed throughout the tropics and subtropics of America, Africa, Asia, and Oceania. *Carasola* (Taboga Isl.).

BOCAS DEL TORO: Lincoln Creek, Chaguinola valley, *Dunlap 377*. CANAL ZONE: Frijoles, *Wilson 51*; Empire, *Hunter & Allen 786*; Ancón, *Greenman & Greenman 5042*; between Corozal and Ancón, *Pittier 2188*; Ahorca Lagarto to Culebra, *Cowell 369*; Balboa, *Macbride & Featherstone 39*; Monte Lirio, *Maxon 6847*; Gamboa, *Bro. Heriberto 29, Standley 28344, Piper 5649*; Gatún, *Standley 27321*; Darién, *Standley 31520, Macbride 2684*. CHIRIQUÍ: Puerto Armuelles, *Woodson & Schery 820*. PANAMÁ: Taboga Island, *Pittier 3534, Killip 3177, Allen 101, Standley 27114, 27845*; San José Island, Pearl Archipelago, *Harlow 47*. SAN BLAS: Permé, *Cooper 222*.

Boerhavia erecta and *B. diffusa* frequently grow together, and hybridization must occur occasionally but insufficiently to blur the outline of the species. In Standley's treatments of *Boerhavia* for the North American Flora and the Flora of the Panama Canal Zone, the parental species would be called *B. erecta* and *B. caribaea,* respectively, and the putative hybrids *B. coccinea.* Such plants will usually key readily to *B. diffusa* in the present treatment. A rather extensive examination of herbarium specimens has revealed no tangible differences between *B. caribaea* and *B. coccinea* of the New World and *B. diffusa* of the Old World. The species appears plainly to be an effusive pantropic weed, the dispersal of which has been greatly facilitated by the viscid anthocarps. It is probably, but not certainly, of American origin.

2. CEPHALOTOMANDRA Karst. & Triana

CEPHALOTOMANDRA Karst. & Triana, ex Karst. in Linnaea 28:429. 1856.

Dioecious trees. Leaves opposite to irregularly approximate. Inflorescences terminal, corymbosely thyrsiform. Flowers small, immediately subtended by 1–3 minute bracteoles. Staminate flowers broadly campanulate; stamens 25–30, unequal, included, the short tube of the filaments hypogynous and free from the sessile pistillode. Pistillate flowers unknown. Anthocarps woody, eglandular, longitudinally costate, the limb of the perianth persistent.

A single species, Panama (?) and Colombia.

1. CEPHALOTOMANDRA FRAGRANS Karst. & Triana, ex Karst. in Linnaea 28:429. 1856.

Cephalotomandra panamensis Standl. in North Am. Flora 21:179. 1918.

Dioecious trees to 25 m. tall. Branches rather stout, glabrous, with a longitudinally striate, scarcely lenticellate, yellow periderm. Leaves rather sparse, long-petiolate, the blade broadly elliptic to ovate-elliptic, Obtusely acuminate to acute, base obtuse or rounded, 8–25 cm. long, 2.5–15.0 cm. broad, glabrous, firmly membranaceous or subcoriaceous, yellowish green, venation prominent but rather

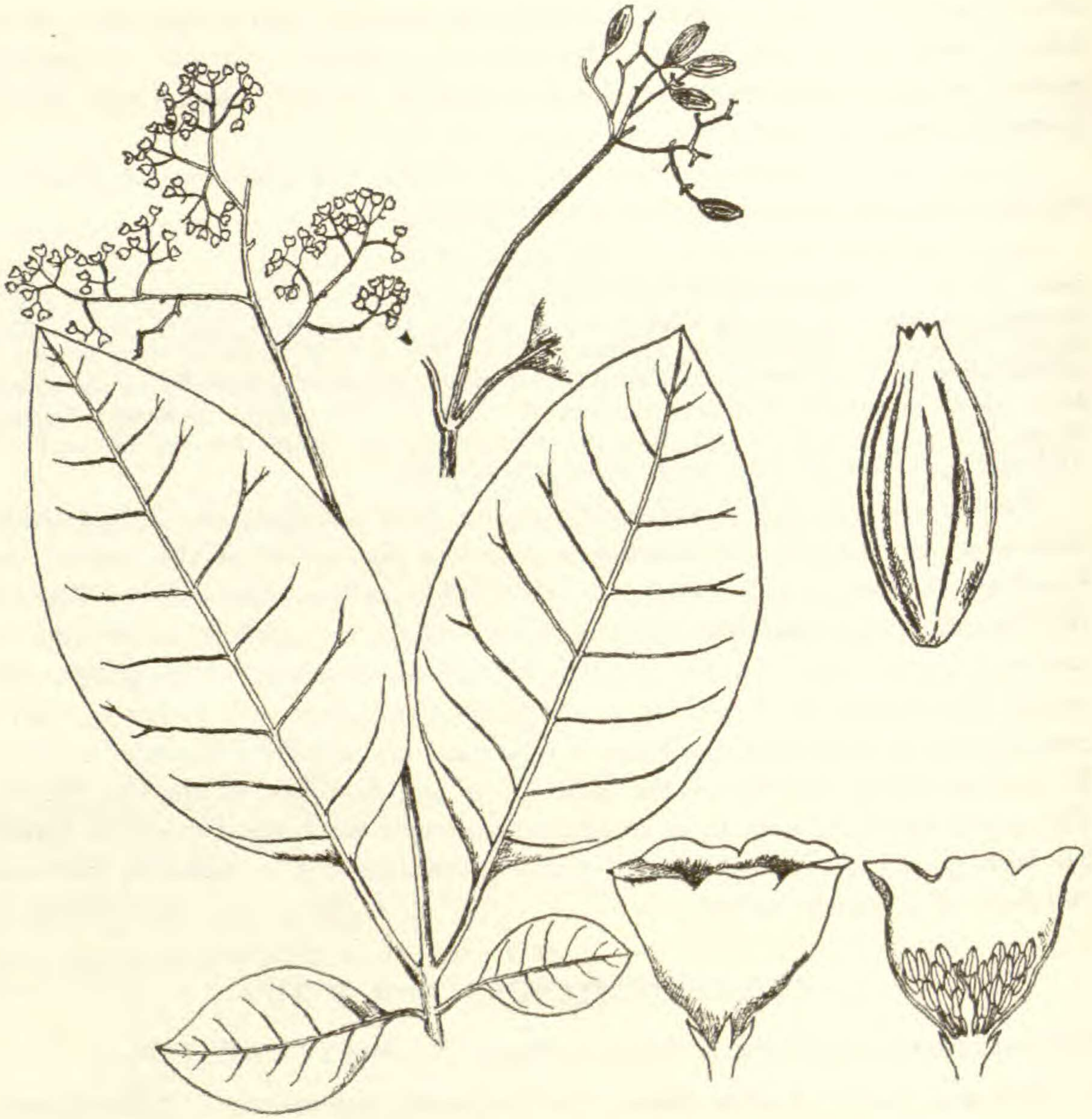

Fig. 123. *Cephalotomandra fragrans*

distant; petiole 1–12 cm. long. Inflorescence 10–20 cm. long, long-pedunculate, many-flowered, minutely puberulent, the ultimate cymules typically dichasial with the terminal flower sessile and 1-bracteolate and the lateral definitely pedicellate and 3-bracteolate. Staminate perianth broadly campanulate, yellowish, about 4 mm. long and 3 mm. broad at the conspicuously inflated, slightly spreading limb, minutely puberulent-papillate. Anthocarps oblong-fusiform, crowned by the persistent perianth limb, about 1 cm. long and 3 mm. broad, glabrous.

CANAL ZONE (?): locality unknown, *Sutton Hayes 998*.

The holotype of *C. panamensis*, cited above from the herbarium of the New York Botanical Garden, is suspiciously similar in all essential details to an isotype of *C. fragrans* (*Triana 998*) deposited in the herbarium of the Missouri Botanical Garden and originally distributed by the British Museum. It may be merely a peculiar coincidence, but it seems more than strange that both sheets bear a small fruiting twig and a small twig with a staminate inflorescence in identical stages of development, and that both the Triana specimen and that ascribed to Sutton Hayes bear the collection number *998*. Karsten's description of *Cephalotomandra* is extremely vague in details of the pistillate inflorescence, and the account of the genus in Bentham & Hooker's Genera Plantarum, although describing the fruit and the staminate flowers, expressly states that the pistillate flowers were not seen by them. I think that it is altogether probable that the New York sheet is actually a second duplicate of Triana's original collection of *C. fragrans* and that its ascription to Sutton Hayes is in error. It is doubtful, therefore, that the genus *Cephalotomandra* can be included in the flora of Panama without serious question.

3. NEEA R. & P.

NEEA R. & P. Fl. Per. Prodr. 52. 1794.

Neeania Raf. Princ. Som. 30. 1814.
Mitscherlichia Kunth, in Abh. Berl. Akad. 1831:209. 1831.
Eggersia Hook. f. in Hook. Ic. 15:1. *t. 1401*. 1883.

Dioecious trees and shrubs. Leaves opposite to irregularly approximate. Inflorescences terminal, thyrsiform. Flowers small, immediately subtended by 1–3 minute bracteoles. Staminate flowers urceolate; stamens 5–10, usually 8, unequal, included, the short tube of the filaments surrounding the sessile pistillode. Pistillate flowers urceolate or tubular-urceolate, the limb of the perianth erect or spreading, the staminodes usually somewhat surpassing the ovary and with enlarged sterile anthers, the pistil sessile. Anthocarps fleshy, eglandular, the limb of the perianth withering and at length abscissing.

Numerous species in the Antilles, and Central and South America; southern peninsular Florida.

a. Cymules strikingly dichasial, the terminal flowers sessile, the lateral with relatively long slender pedicels; leaves predominantly rather small or of moderate size, and only very rarely somewhat pubescent beneath.
  b. Inflorescences usually quite glabrous, the pedicels of lateral flowers as long as the perianths or somewhat longer; staminate perianths ovoid-urceolate; anthocarps broadly ellipsoid.......... 1. N. DELICATULA
  bb. Inflorescences minutely puberulent, the pedicels as long as the perianths or somewhat shorter; staminate perianths oblong-urceolate; anthocarps narrowly ellipsoid.......... 2. N. LAETEVIRENS
aa. Cymules obscurely dichasial, both terminal and lateral flowers subsessile or with similar short stout pedicels; leaves predominantly large and frequently more or less pubescent beneath.......... 3. N. AMPLIFOLIA

1. NEEA DELICATULA Standl. in Contr. U. S. Nat. Herb. 18:98. 1916.

Torrubia panamensis Standl. in North Am. Fl. 21:185. 1918.

Dioecious shrubs or small trees to 6 m. tall. Branches rather slender, glabrous or minutely puberulent when very young, inconspicuously lenticellate at maturity.

Leaves petiolate, the blade predominantly obovate to obovate-elliptic, acuminate, obtusely cuneate at the base, 4–12 cm. long, 2–4 cm. broad, firmly membranaceous, glabrous, the petiole 2–15 mm. long. Inflorescences 4–7 cm. long, usually glabrous, rarely minutely puberulent, rather few-flowered, the peduncles slender, the cymules strikingly dichasial, the terminal flowers sessile, the lateral with slender pedicels as long as the flowers or somewhat longer. Staminate perianths ovoid-urceolate, about 6 mm. long and 3 mm. broad, glabrous. Pistillate perianths tubular, about 3 mm. long and somewhat less than 1 mm. broad, minutely puberulent to glabrous. Anthocarps broadly ellipsoid or ellipsoid-obovoid, 8–10 mm. long, 4–5 mm. broad, pink or red.

Panama, in forests and thickets near sea level to 100 m. alt.

CANAL ZONE: Balboa, *Standley 32114*. PANAMÁ: around Alajuela, Chagres valley, *Pittier 3472*; Tumba Muerto Road, near Panamá, *Standley 29805*; near Matías Hernández, *Standley 28880*; Río Tapia, *Standley 28201*; Taboga Island, *Pittier 3602*; Trapiche Island, Perlas Islands, *Allen 2422*. PROVINCE UNKNOWN: *Seemann s. n. pro parte.*

I believe it quite possible that *N. delicatula* and *N. anisophylla* Ernst, of Colombia and Venezuela (= *N. wiesneri* Heimerl) may be conspecific. The leaves of the latter, however, appear to be somewhat larger than those of the former, as well as of a somewhat different pattern of shape; the staminate perianths, also, seem to be somewhat narrower than those from Panama.

The type specimen of *Torrubia panamensis* definitely is *Neea* and differs from the other specimens cited only in the thin minute pubescence of the peduncles.

Comments on the Seemann collection are included in the discussion of *Guapira standleyana.* Seemann's illustration of *Pisonia pacurero* (in Bot. Voy. Herald, *pl. 34.* 1854) may have been prepared from a specimen of *Neea delicatula,* but is not definitely diagnostic.

2. **Neea laetevirens** Standl. in Field Mus. Publ. Bot. 4:204. 1929.

Neea xanthina Standl. in Ann. Missouri Bot. Gard. 30:86. 1943.
Neea psychotrioides auct. pro parte, non Donn. Sm.

Dioecious shrubs or small trees to 7 m. tall. Branches rather slender, minutely puberulent to glabrate, inconspicuously lenticellate at maturity. Leaves petiolate, the blade elliptic to obovate- or oblong-elliptic, rarely lanceolate, acuminate, obtuse to cuneate, 5–23 cm. long, 3–9 cm. broad, glabrous or rarely very inconspicuously puberulent beneath particularly on the midrib, the petiole 0.5–4.0 cm. long. Inflorescences 8–20 cm. long, minutely puberulent, many-flowered, the cymules strikingly dichasial with the terminal flowers sessile and the lateral with slender pedicels as long as the flowers or somewhat shorter. Staminate flowers oblong-urceolate, 6–9 mm. long, 2–3 mm. broad, thinly and minutely puberulent, white, yellow, or red. Pistillate flowers tubular, the lobes erect or suberect, conspicuously thickened at the orifice of the tube, 4–5 mm. long, 1.0–1.5 mm. broad, densely and minutely puberulent. Anthocarps narrowly ellipsoid, 7–10 mm. long, 2–3 mm. broad, red.

Panama and Costa Rica, in moist forests and thickets near sea level.

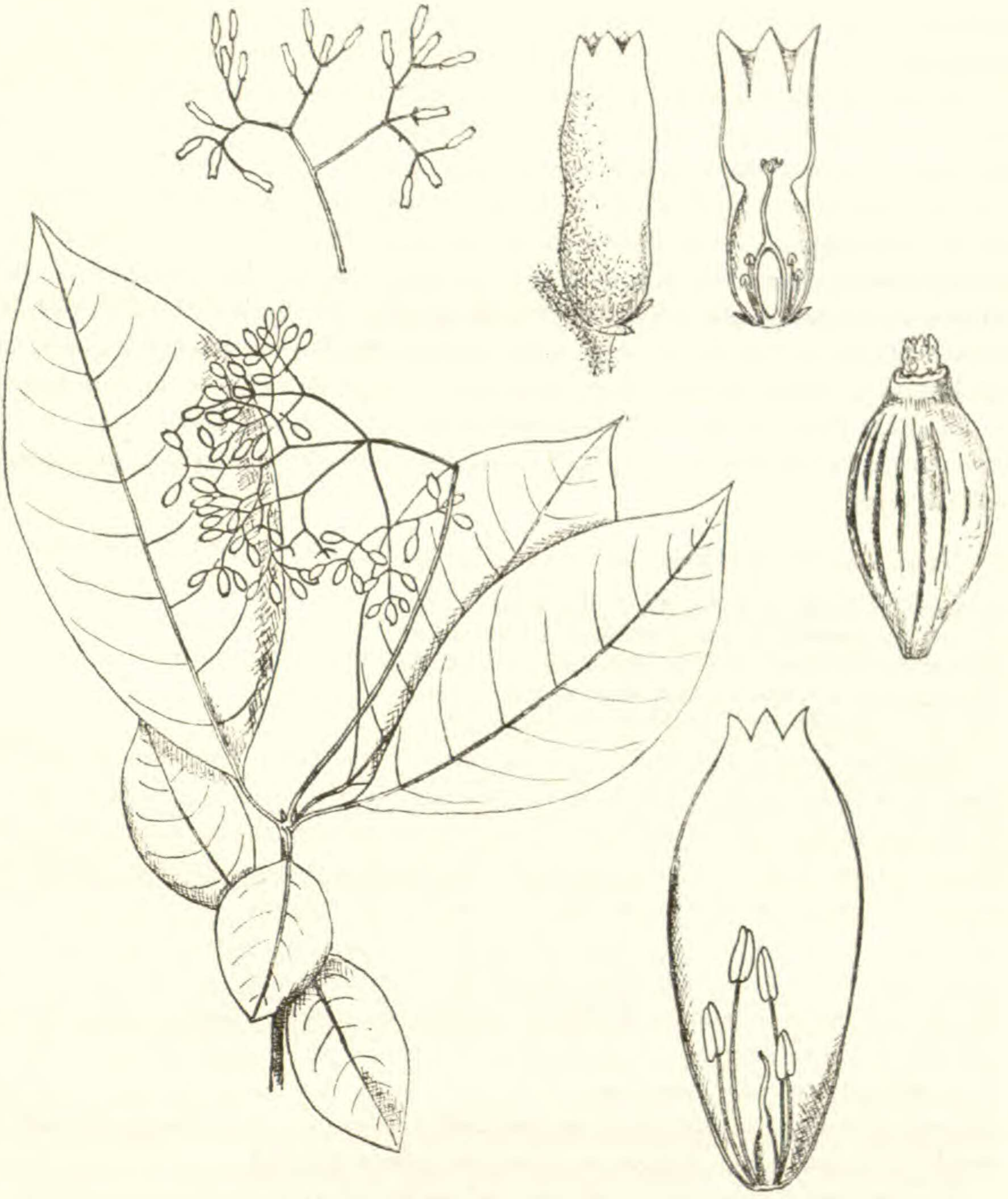

Fig. 124. *Neea laetevirens*

BOCAS DEL TORO: Old Bank Island, *Von Wedel 1885, 1970*; Little Bocas, *Von Wedel 2533*; Fish Creek Hills, *Von Wedel 2433*; Shepherd Island, *Von Wedel 2695*; Río Cricamola, *Woodson, Allen & Seibert 1914*; region of Almirante, *Cooper 340, 544, 572a*; Isla Colón, *Von Wedel 2793, 2842*; Water Valley, *Von Wedel 730, 979, 1678, 1810*; Changuinola Valley, *Dunlap 94, 136, 511, 519, 562, 488, 329; Cooper & Slater 106*; Farm Six, *Stork 94*; vicinity of Chiriquí Lagoon, *Hart 168; Von Wedel 1105, 1182, 1298, 1145*. SAN BLAS: Permé, *Cooper 639*.

This is the species which has been determined almost invariably as *Neea psychotrioides* in Panama. The specimens enumerated above are relatively uniform; but the species apparently is capable of hybridization with *N. amplifolia,* although such specimens will usually key to the latter under the discussion of which they will be noted.

There probably are scarcely more than a half dozen valid species of *Neea* in Central America. These seem to form two vicarious series upon the Pacific and the Atlantic slopes, recognizable by the staminate perianths which are ovoid- or oblongoid-urceolate respectively. True *N. psychotrioides* is a representative of the former series, as is *N. delicatula* of Panama. Both Panamanian species are distinguishable from their related species to the north by their longer-pedicelled flowers and proportionally longer lobes of the pistillate perianths. True *N. psychotrioides* extends on the Pacific slope from southern Mexico to Nicaragua and is not yet known to occur in Costa Rica, although it might be expected in Guanacaste.

In Costa Rica, *N. laetevirens* has been collected at Puerto Limón, and up the Reventazón and Parismina watersheds to the highlands of the provinces of Alajuela and Cartago.

3. NEEA AMPLIFOLIA Donn. Sm. in Bot. Gaz. 61:386. 1916.

Neea pittieri Standl. in Contr. U. S. Nat. Herb. 13:383. 1911.
Neea orosiana Standl. in Journ. Wash. Acad. Sci. 15:473. 1925.
Neea urophylla Standl. in Field Mus. Publ. Bot. 4:203. 1929.
Neea pycnantha Standl. in Ann. Missouri Bot. Gard. 30:85. 1943.
Neea psychotrioides auct. pro parte, non Donn. Sm.

Dioecious shrubs and small trees to about 7 m. tall. Branches moderately stout, densely ferruginous-pubescent to glabrate. Leaves petiolate, the blade ovate- to obovate-elliptic, usually more or less caudate-acuminate, obtuse to cuneate at the base, 7–36 cm. long, 3–15 cm. broad, firmly membranaceous, glabrous above but frequently more or less puberulent beneath, the petiole 0.5–5.0 cm. long. Inflorescences 4–15 cm. long, essentially glabrous to densely ferruginous-pubescent, rather few-flowered to many-flowered and occasionally greatly proliferous and the flowers and bracts becoming phylloid; cymules obscurely dichasial, both terminal and lateral flowers subsessile or with essentially similar short stout pedicels. Staminate perianths tubular-urceolate, 5–10 mm. long, 2–3 mm. broad, essentially glabrous to minutely puberulent to essentially glabrous. Anthocarps ellipsoid to ovoid, 7–12 mm. long, glabrous to minutely puberulent, red.

Panama and Costa Rica, in forests and moist thickets, from near sea level to about 700 m.

BOCAS DEL TORO: region of Almirante, Daytonia Farm, *Cooper 545, 373*; Almirante region, *Cooper & Slater 58*; Changuinola valley, *Cooper & Slater 60, 140*; Cricamola, *Cooper 491*; Fish Creek Mts., *Von Wedel 2267*; vicinity of Chiriquí Lagoon, *Von Wedel 1011, 1017*; Water Valley, *Von Wedel 1574, 1609, 1503, 1433, 927*. CANAL ZONE: hills north of Frijoles, *Standley 27427, 27509*; Margarita Swamp, south of France Field, *Maxon & Valentine 7048*; Gatún, *Sutton Hayes 626*; railroad relocation between Gorgona and Gatún, *Pittier 2265, 2271*; Barro Colorado Island, *Frost 123, Kenoyer 491, 638, Aviles 30, Bailey & Bailey 120, 522, Wetmore & Abbe 22, Standley 31310, 31336, 40905, 40955, 41023, 41015*. CHIRIQUÍ: Progreso, *Cooper & Slater 184*. COCLÉ: region north of El Valle de Antón, *Allen 3732*. COLÓN: between France Field and Catival, *Standley 30182*; along Río Fató, *Pittier 3912*. DARIÉN: trail between Pinogana and Yavisa, *Allen 268*; forests around Pinogana, *Pittier 6547*. SAN BLAS: forests around Puerto Obaldía, *Pittier 4397*.

Neea amplifolia usually can be keyed without difficulty from the two preceding species, particularly by means of the inflorescence characters, the predominantly larger leaves and staminate perianths, and the more frequent and abundant indument. In all respects intermediates occur, nevertheless, and the relative abundance of disparate specimens, particularly from Bocas del Toro, where *N. laetevirens* also is abundant and variable, provides grounds for strongly suspected hybridization.

The proliferation and phyllody of the inflorescence is a frequent and puzzling propensity of this species, the agent of which is obscure. In addition, both in *N. amplifolia* and in *N. laetevirens,* the terminal staminate flowers occasionally develop at the expense of the lateral.

4. GUAPIRA Aubl.

GUAPIRA Aubl. Hist. Pl. Guian. 1:308; 3: *t. 119.* 1775.

Gynastrum Neck. Elem. 1:224. 1790.
Torrubia Vell. Fl. Flum. 139. 1825; Icon. 3: *t. 150.* 1827, *non* Tul.

Dioecious trees and shrubs. Leaves opposite to irregularly approximate. Inflorescences terminal, frequently at the tips of short lateral branches, corymbosely thyrsiform. Flowers small, immediately subtended by 1–3 minute bracteoles. Staminate flowers campanulate; stamens usually 6–8, unequal, widely exserted, the short tube of the filaments adnate to the stipe of the pistillode. Pistillate flowers tubular to tubular-campanulate, the limb of the perianth erect or spreading, the staminodes about as long as the ovary and with enlarged sterile anthers, the short tube of the filaments adnate to the stipe of the pistil. Anthocarps fleshy, eglandular, the limb of the perianth persistent and rather fleshy.

Numerous species in the Antilles, and Central and South America.

There can be little doubt that *Guapira* Aubl. is congeneric with *Torrubia* Vell. as suggested by Heimerl (in Engl. Nat. Pflanzenfam. ed. 2. 16^{c}:127. 1934) and not an indecipherable verbenacea as previously held by many (although questioned by Bentham & Hooker). The specimen illustrated by Aublet obviously is pistillate and, with the understandable error of the four to five minute "leaflets of the calyx [i. e. bracteoles]", is a good representation of *Torrubia* for its time, particularly with respect to the fruit with its persistent perianth limb (*"Drupa monosperma . . coronata denticulis corollae, quae evadit pulposa"*), and the persistent style crowned by a penicillate stigma. With the exception of the supernumary bracteoles, the figure of the flower also is good, showing the spreading perianth limb characteristic of so many South American Torrubias, and the widely exserted style and penicillate stigma. The single species described by Aublet, *G. guianensis*, perhaps is conspecific with *Torrubia eggersiana* (Heimerl) Standl.

Perhaps too many transfers from *Pisonia* to *Torrubia* already have been made by Britton and by Standley, and one might be inclined to submit *Torrubia* as a candidate for conservation over *Guapira* in order to avoid additional transfers to the latter. I am inclined not to do so, however, for the following reasons. *Torrubia* has not generally been considered as distinct from *Pisonia,* and consequently the transfers to the former are not in wide use; transfer to *Guapira* therefore would entail little mental adjustment and inconvenience at this date. Both *Torrubia* and *Guapira* are based upon rather inadequate antique illustrations, but those of the latter are definitely more capable of critical interpretation than the former; it furthermore will be much easier to associate *G. guianensis* with a modern species than *T. opposita* Vell.

a. Anthocarps globose or subglobose; pistillate perianths about 2 mm. long, the limb spreading; stamens about half exserted; leaves predominantly elliptic and acuminate........ 1. G. COSTARICANA

aa. Anthocarps oblong-fusiform; pistillate perianths about 3 mm. long, the limb erect; stamens about one-third exserted; leaves predominantly obovate and obtuse........ 2. G. STANDLEYANA

1. GUAPIRA **costaricana** (Standl.) Woodson, comb. nov.

Torrubia costaricana Standl. in Contr. U. S. Nat. Herb. 13:385. 1911.

Small dioecious trees to 10 m. tall. Branches moderately stout, glabrous, prominently lenticellate at maturity. Leaves rather crowded, petiolate, the blade predominantly elliptic to oblong-elliptic, acuminate, obtuse at the base, 2.5–10.0 cm. long, 1.5–4.5 cm. broad, subcoriaceous, glabrous, the petiole 0.5–1.0 cm. long. Inflorescences 3–6 cm. long, rather shortly pedunculate, many-flowered, minutely puberulent, conspicuously accrescent in fruit, the flowers sessile. Staminate perianth campanulate, about 3 mm. long, about 0.5 mm. in diameter at the base and 2 mm. at the orifice, minutely puberulent, greenish white or yellow, the stamens about half exserted. Pistillate flowers tubular-campanulate, the limb slightly spreading, about 2 mm. long and 0.5 mm. in diameter, minutely puberulent-papillate. Anthocarps globose or subglobose, about 7–8 mm. long, black or purple when ripe.

Costa Rica and Panama, in forests and savannas, sea level to 1000 m.

CHIRIQUÍ: Boquete, *Davidson 689*; David, *Pittier 3370*. COCLÉ: Valle de Antón, *Bro. Maurice 777*; north rim of El Valle, *Alston & Allen 1847*; region north of El Valle de Antón, trail to Las Minas, *Allen 2472*.

Brother Maurice reports the vernacular names of *llanto* and *mala sombra*. *Guapira costaricana* is widely distributed also on the Pacific slope of Costa Rica. In both countries the leaves of plants growing at higher elevations seem broader and more elliptic than those of lower elevations. The fruit, however, is relatively constant.

2. GUAPIRA **standleyana** Woodson, spec. nov.

Arbor dioica usque ca. 10 m. alta. Ramuli graciliusculi indistincte lenticellati juventate tenue puberuli mox glabrati. Folia densiuscula sed mox decidua petiolata lamina praecipue obovata vel obovato-elliptica brevissime acuminata vel obtusa basi latiuscule cuneata 3–15 cm. longa 1–6 cm. lata firmiter membranacea glabra petiolo 0.5–1.0 cm. longo. Inflorescentiae 4–8 cm. longae minute puberulae in fructu paulo accrescentes floribus sessilibus vel subsessilibus. Perianthium masculum campanulatum ca. 3.5 mm. longum faucibus ca. 2 mm. diam. minute

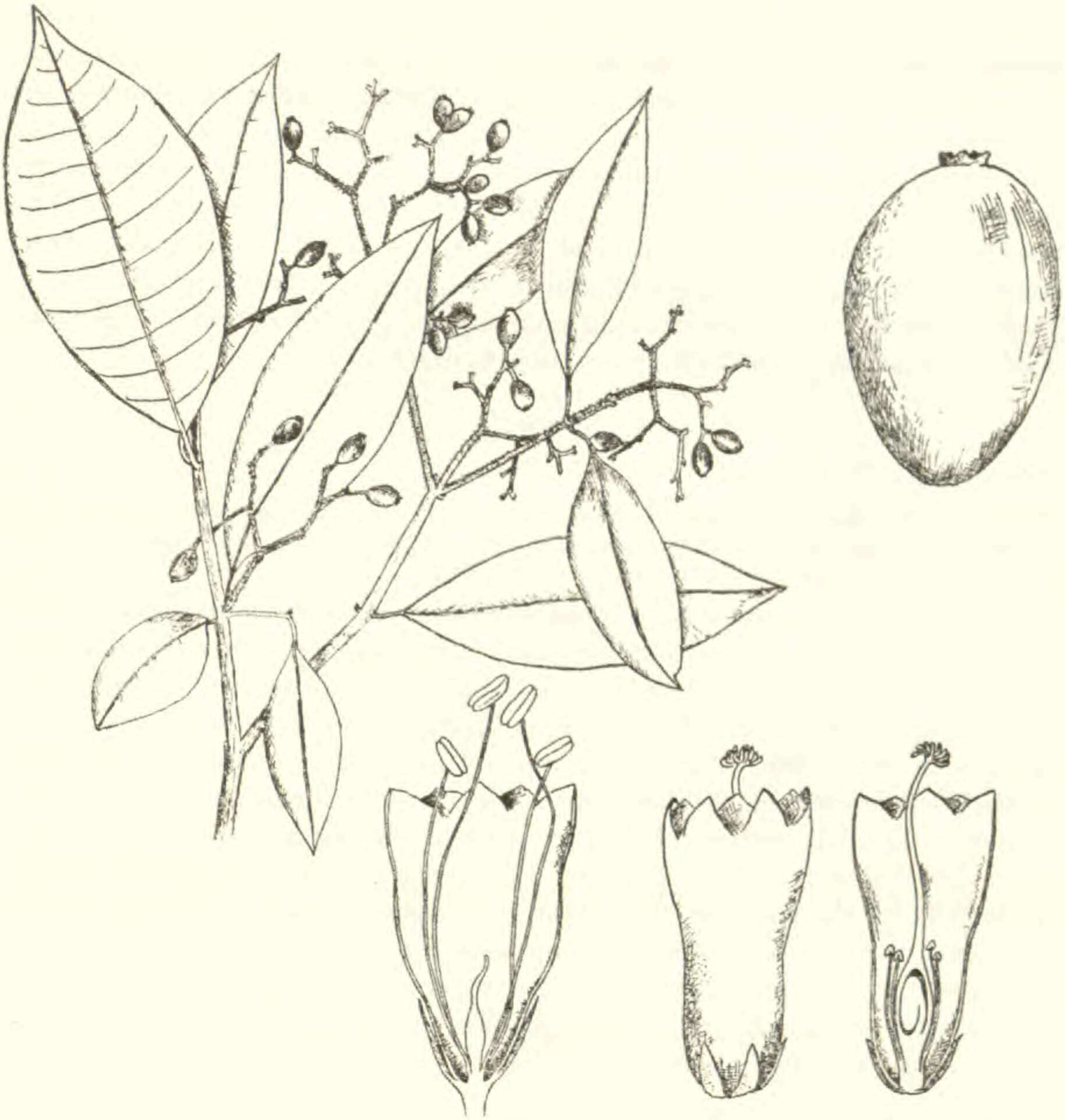

Fig. 125. *Guapira costaricana*

puberulo-papillatum staminibus ca. tertio exsertis. Perianthium femineum tubulosum limbo erecto vel fere erecto ca. 3 mm. longum et 0.5 mm. diam. minute puberulum. Anthocarpia oblongo-ellipsoidea 10–13 mm. longa ca. 6–7 mm. lata rubra (aetate immatura?).

Panama, in savannas and bush, near sea level.

CANAL ZONE: near Gorgas Memorial Laboratory [Cocoli], *P. White 109*; bank of Río Cocoli, *P. White 104*. PANAMÁ: sabanas north of Panama City, *Bro. Paul 467*; Taboga Island, *Pittier 3544* (US, HOLOTYPE; F); vicinity of Juan Franco Race Track, near Panamá, *Standley 27747*; between Las Sabanas and Matías Hernández, *Standley 31823*. SAN BLAS: forests around Puerto Obaldía, *Pittier 4316*. PROVINCE UNKNOWN: *Seemann s. n. pro parte*.

Sharply distinguished from *G. costaricana* because of the rather narrow oblong-ellipsoid fruit. Two dupla of the Seemann collection seen in the herbarium of the New York Botanical Garden and the Gray Herbarium consist of mixtures; the former of *Guapira standleyana* and *Neea delicatula,* and the latter of *Guapira standleyana, Neea delicatula,* and *Pisonia aculeata.* This mixture may be responsible for Seemann's remarks on the "hermaphrodite" flowers of his collection, which he cited under *Pisonia pacurero* HBK., and the difficulty of distinguishing *Neea* from *Pisonia* (Seemann, in Bot. Voy. Herald, p. 192. 1854). Seemann's plate of *P. pacurero* clearly is a pistillate *Neea,* although not definitely *N. delicatula.* Seemann cited his collection from "dark forests, near Cruces."

5. PISONIA L.

Pisonia L. Sp. Pl. 1026. 1753.

Bessera Vell. Fl. Flum. 147. 1825; Icon. 4: *t. 12.* 1841, *nec* Schult, *nec alior.*
Columella Vell. loc. cit. 155. 1825; Icon. 4: *t. 17.* 1841, *nec* Comm. *nec* Lour.
Pallavia Vell. loc. cit. 151. 1825; Icon. 4: *t. 12.* 1841.

Shrubs or small trees, usually scandent and armed with stout axillary spines in our species. Leaves opposite to irregularly approximate. Inflorescences usually terminal on highly modified short shoots, umbelliform or densely corymbiform-thyrsiform. Flowers small, the subtending bracteoles in a more or less contracted spiral upon the pedicel. Staminate flowers campanulate; stamens usually 6–8, unequal, widely exserted, the short tube of the filaments adnate to the stipe of the pistillode. Pistillate flowers tubular, the limb of the perianth apparently always erect, the staminodes reduced to a low, occasionally glandular-dentate disc adnate to the stipe of the pistillode. Anthocarps pentagonal-clavate, coriaceous, armed with longitudinal rows of stipitate glands upon the angles.

Numerous species in the Antilles, Central and South America; southern peninsular Florida; western Africa, southeastern Asia and Oceania. A single species is known from Panama at present.

1. Pisonia aculeata L. Sp. Pl. 1026. 1753.

Pisonia villosa Poir. in Lam. Dict. 5:347. 1804.
Pisonia sieberi Schlecht. in Linnaea 12:876. 1822.
Pisonia loranthoides HBK. Nov. Gen. & Sp. 7:197. 1825.
Pisonia monotaxadenia Wright, ex Sauv. in Anal. Acad. Cien. Habana 7:199. 1870.
Pisonia grandifolia Standl. in Contr. U. S. Nat. Herb. 13:391. 1911.

Divaricately branched shrub or woody liana, usually armed with stout recurved axillary spines, glabrous to densely pubescent. Leaves opposite to irregularly approximate, the blade very variable in shape and size, usually obovate to obovate-elliptic, acute to acuminate, 2–10 cm. long, 1–5 cm. broad, the petiole 1–3 cm. long. Inflorescences usually borne at the tips of greatly condensed short shoots, umbelliform or densely corymbiform-thyrsiform, rather shortly pedunculate, 3–6 cm. long, greatly accrescent and expanded in fruit, many-flowered. Staminate flowers campanulate, greenish yellow, about 3 mm. long, about 2 mm. in diameter at the orifice of the limb, minutely puberulent-papillate without, the stamens

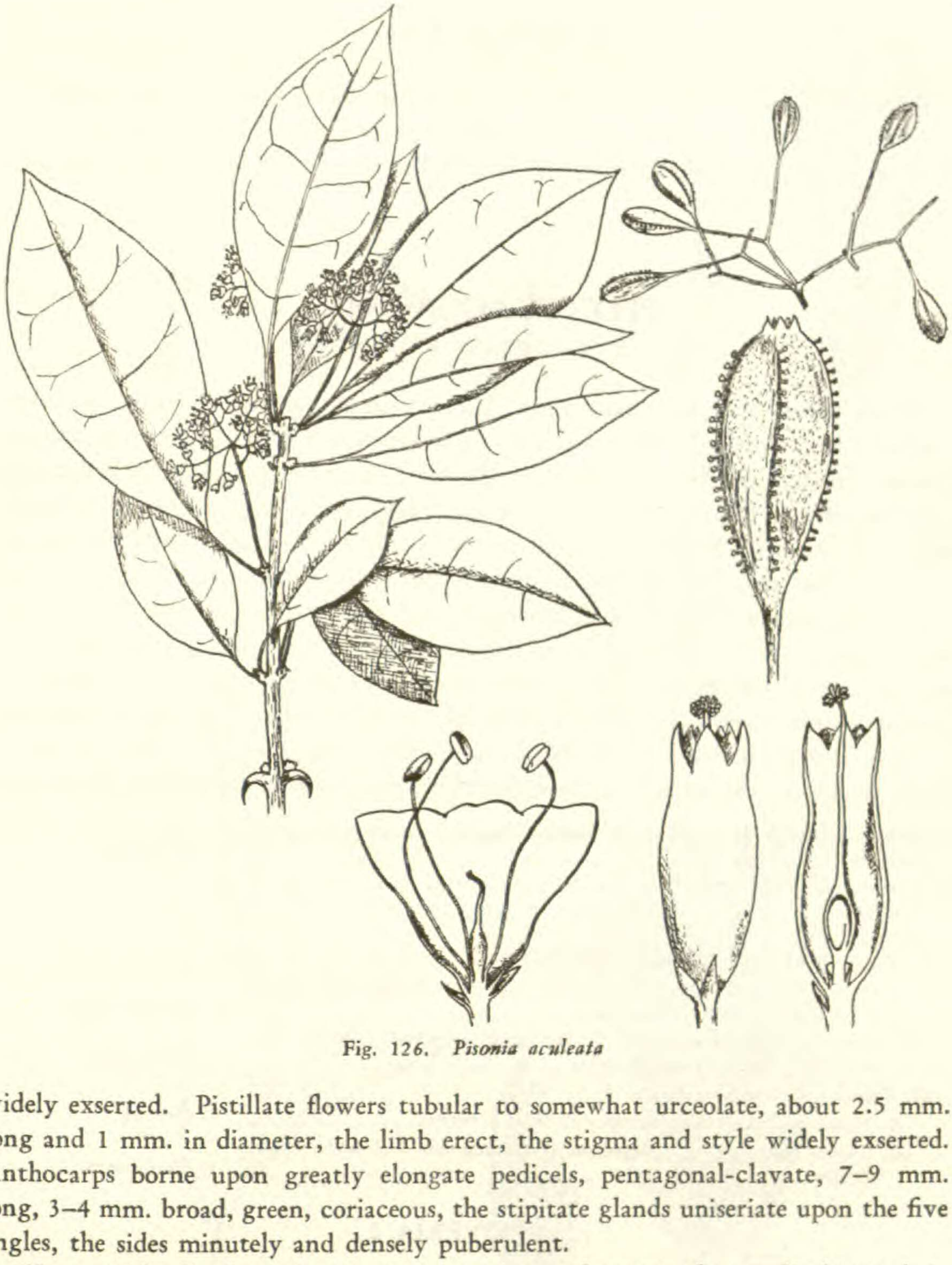

Fig. 126. *Pisonia aculeata*

widely exserted. Pistillate flowers tubular to somewhat urceolate, about 2.5 mm. long and 1 mm. in diameter, the limb erect, the stigma and style widely exserted. Anthocarps borne upon greatly elongate pedicels, pentagonal-clavate, 7–9 mm. long, 3–4 mm. broad, green, coriaceous, the stipitate glands uniseriate upon the five angles, the sides minutely and densely puberulent.

Very widely distributed in tropical America, and apparently a ruderal introduction in western Africa and southeastern Asia; in rain forests and moist thickets from sea level to about 1000 m.

CANAL ZONE: Barro Colorado Island, *Standley 40933, Standley 40918*. COCLÉ: hills north of El Valle de Antón, *Allen 2835*. PANAMÁ: Juan Díaz, *Standley 30472*; Río Tapía, *Standley 28251*. PROVINCE UNKNOWN: *Seeman s. n. pro parte.*

This species must be very much more frequent than the records would indicate. It is popularly known as *uña de gato,* in allusion to the stout recurved thorns.

BATIDACEAE

Batis maritima L. is to be expected in Panama. This dioecious herbaceous to fruticose plant with opposite, simple, entire and sessile leaves is the sole species of the family. It is an inhabitant of the beaches of subtropical and tropical America and the Hawaiian Islands.

PHYTOLACCACEAE

By KATHERINE RAEDER

Herbs, shrubs or trees, often vines. Leaves simple, entire, alternate, petiolate or subpetiolate, with or without stipules. Inflorescence in terminal or extra-axillary racemes, although occasionally axillary. Flowers bisexual or unisexual by reduction, actinomorphic; perianth monochlamydeous; tepals generally 4–5, free or slightly connate at the base, usually persistent in fruit; stamens 3–many, often varying in number within the same species, frequently borne on a hypogynous disc in 1 or 2 cycles opposite or alternate with the tepals, the filaments free or basally connate; ovary superior, rarely inferior, 1- to 16-carpellate, the carpels free to partly or entirely connate, the styles when present as many as the carpels, usually terminal, sometimes subterminal, generally free but occasionally united, the stigma capitate, or sessile and penicillate; ovules basal, campylotropous, solitary. Fruit a berry, drupe, or achene, the seeds 1–many. Embryo coiled or bent around the perisperm.

- a. Flowers subsessile in terminal or axillary racemes; tepals persistent in fruit, erect; fruit an achene.......... 1. PETIVERIA
- aa. Flowers obviously pedicellate; tepals persistent in fruit (except in *Phytolacca rivinoides*), reflexed, erect, or spreading; fruit a berry or drupe.
  - b. Tepals 5; ovary 2- to many-carpellate.
    - c. Ovary 6- to 15-carpellate; styles free but connivent; stamens 6–33; fruit a many-seeded berry.......... 2. PHYTOLACCA
    - cc. Ovary 2-carpellate; styles 2, free and recurved; stamens 3–9, usually 5; fruit a 1-seeded drupe.......... 3. MICROTEA
  - bb. Tepals 4; ovary 1-carpellate.
    - d. Tepals erect in fruit; stamens 4; fruit a berry.......... 4. RIVINA
    - dd. Tepals spreading or reflexed in fruit; stamens 8 (–25); fruit a drupe.......... 5. TRICHOSTIGMA

1. PETIVERIA L.

PETIVERIA L. Sp. Pl. 342. 1753.

Tall herbs, sometimes woody at the base. Leaves alternate, simple, entire, petiolate, minutely stipulate. Inflorescence an elongate terminal or axillary raceme, the flowers small, subsessile, bracteate and bracteolate. Tepals 4, united into a short tube, the lobes subequal, linear, persistent and erect in fruit. Stamens 8, inserted irregularly on a hypogynous disc at the base of the ovary, the filaments filiform and of varying lengths, the anther linear, dorsifixed. Ovary 1-carpellate,

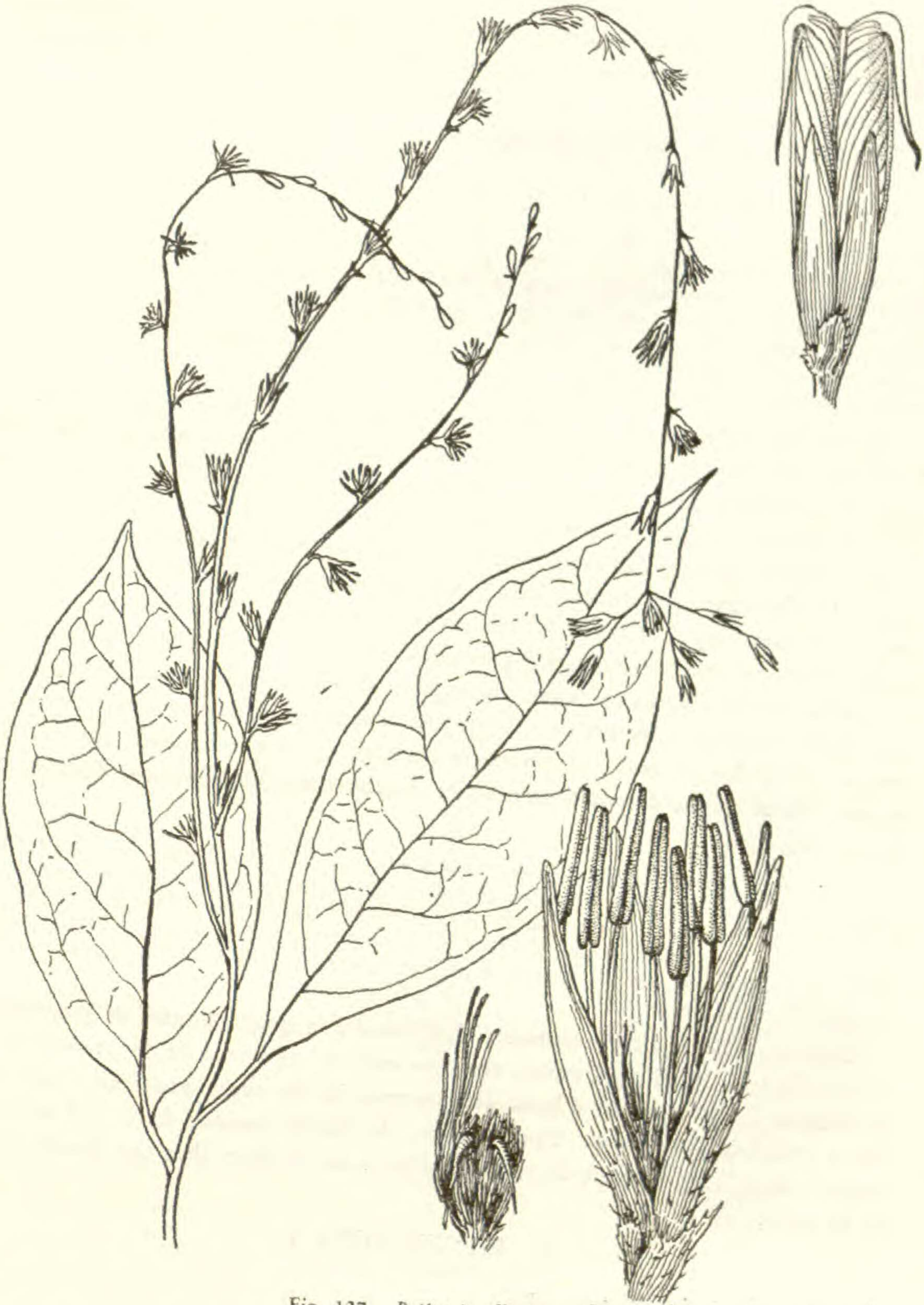

Fig. 127. *Petiveria alliacea*

oblong, tomentose, 4- to 6-uncinate, the stigma 1, sessile, penicillate, decurrent along the ventral margin of the ovary, the ovule 1, basifixed. Fruit a linear achene; pericarp coriaceous and adherent to the seed. Seed 1, linear, the testa membranous, the albumen scanty and mealy, the cotyledons foliaceous.

Two species in the Western Hemisphere.

1. **Petiveria alliacea** L. Sp. Pl. 342. 1753.

Petiveria octandra L. Sp. Pl. 486. 1762.
Petivera foetida Salisb. Prodr. 214. 1796.
Petiveria alliacea β grandifolia (L.) Moq. in DC. Prodr. 13^2:9. 1849.
Petiveria alliacea γ octandra (L.) Moq. loc. cit. 1849.
Petiveria ochroleuca Moq. loc. cit. 1849.
Petiveria paraguayensis Parodi, in Anal. Soc. Cient. Argent. 160. 1878.
Petiveria hexandria Sesse & Moc. Fl. Mex. ed. 2. 90. 1894.

Tall herbs, often woody at the base, with slender sometimes angled stems, to 5–10 dm. tall, with a strong odor of garlic. Leaves elliptic to obovate, the apex acute or acuminate, often mucronate, the base narrowed, 5.5–16.0 cm. long, about 2–6 cm. broad, slightly pubescent; petioles 1.5–2.0 cm. long. Inflorescence in slender usually sparsely flowered racemes 15–40 cm. long; pedicels up to 1 mm. long. Tepals white or greenish-white, sometimes pale pink, often basally pubescent, about 3–5 mm. long. Stamens 8, free, up to 3 mm. long. Ovary 4-uncinate, the hooks becoming elongate and quite prominent in fruit. Fruit linear, 8 mm. long.

United States, Florida to Texas; throughout the West Indies and Central America; South America, Colombia to Argentina; common in dry or moist fields and forests, often found near habitations, especially on waste ground, up to 1500 meters. Some of the common names are: Garlic-weed, Obeah-bush, Anomu, and Guinea-hen weed.

BOCAS DEL TORO: Chiriquí Lagoon, *Von Wedel 1323*; Water Valley, *Von Wedel 636*. CHIRIQUÍ: Puerto Armuelles, *Woodson & Schery 841, 900*; between Remedios and David, *P. White 308*; Río Dupí, *Pittier 5222*. CANAL ZONE: Ancón Hill, *Standley 26336*; Las Cruces Trail, Government forest, *Hunter & Allen 731, 694*. PANAMÁ: Taboga Island, *Allen 1291; Standley 27838, 27025; Woodson, Allen & Seibert 1470; Macbride 2791*. DARIÉN: Pinogana, *Allen 940*.

Petiveria alliacea closely resembles *P. tetrandra*, a species limited in geographical distribution to Brazil. However, the two may be separated fairly readily by the presence in *P. tetrandra* of 6 hook-like processes in the ovary and fruit rather than the 4 found in *P. alliacea*. Furthermore, the flower pedicels in *P. tetrandra* are about 5 mm. long, whereas those of *P. alliacea* are so short that the flowers appear to be sessile.

2. PHYTOLACCA L.

Phytolacca L. Sp. Pl. 441. 1753.

Sarcoca Raf. Tell. 3:55. 1837.
Pircunia Moq. in DC. Prodr. 13^2:29. 1849.

Tall perennial herbs or shrubs. Leaves alternate, simple, entire, petiolate, exstipulate, generally glabrous. Inflorescence a terminal, or extra-axillary raceme;

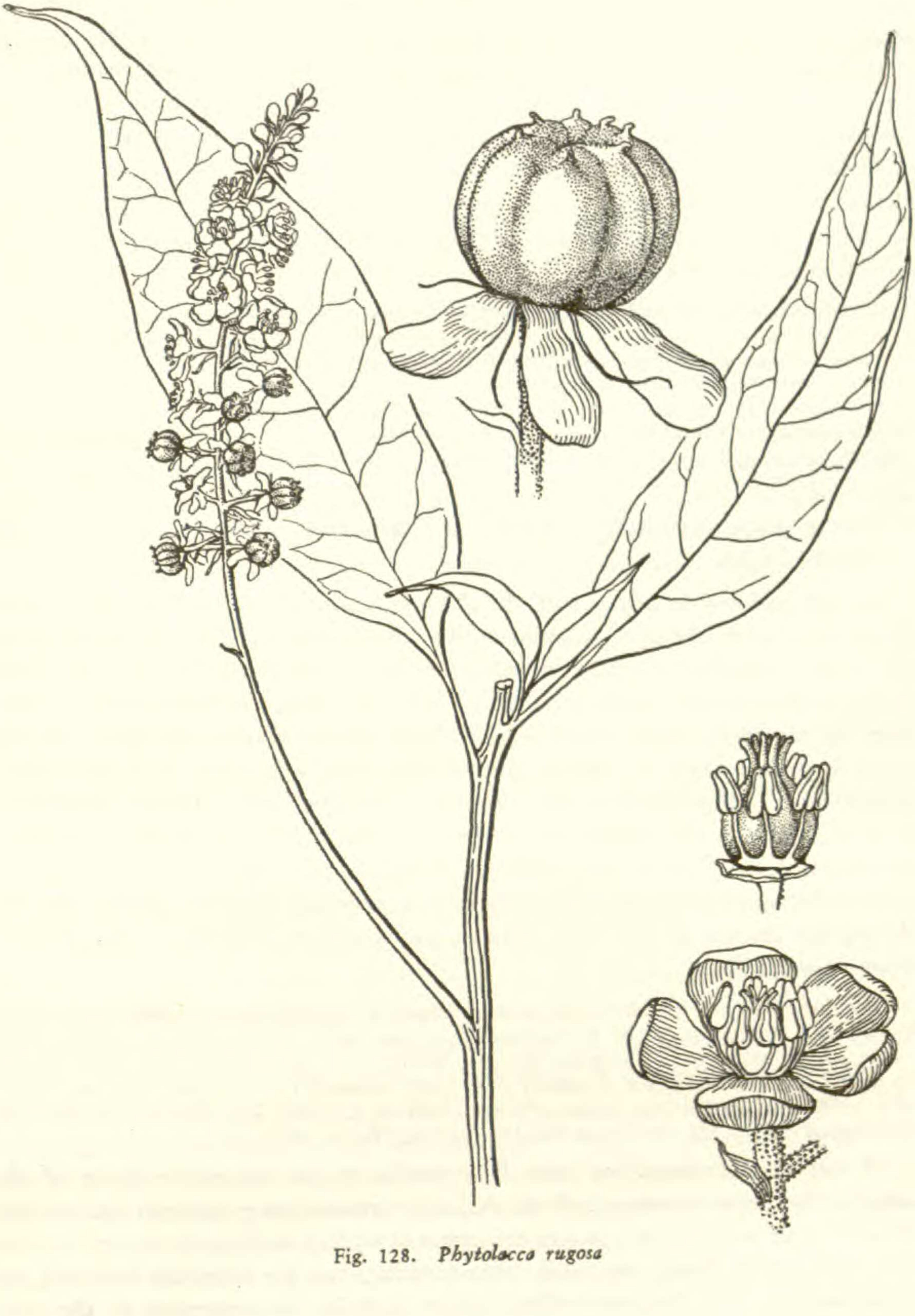

Fig. 128. *Phytolacca rugosa*

the pedicels basally bracteate, often with 1 or more bracteoles above. Tepals 5, equal, usually glabrous, persistent or deciduous in fruit. Stamens 8–22, inserted at the base of the calyx usually on a hypogynous disc, in 1 or 2 cycles, the filaments free, the anthers dorsifixed. Ovary subglobose, 5- to 16-carpellate, the carpels completely or only partly united, the styles equal in number to the carpels, terminal, generally connivent, often recurved, the ovule solitary in each cavity. Fruit a globose 5- to 16-celled fleshy berry. Seed 1 in each cavity, the endosperm mealy.

About 26 species, tropical and subtropical, mostly in the Americas, some in Africa, Asia, and Asia Minor.

a. Carpels connate at the base, the apices free; styles free; tepals reflexed in fruit .... 1. P. RUGOSA
aa. Carpels completely connate, styles free but connivent; tepals either erect or spreading in fruit, or deciduous.
  b. Carpels 6–10; stamens 8–20; tepals erect or spreading in fruit; raceme up to 20 cm. long .... 2. P. ICOSANDRA
  bb. Carpels 10–16; stamens 9–22; tepals deciduous in fruit; raceme up to 55 cm. long .... 3. P. RIVINOIDES

1. PHYTOLACCA RUGOSA Br. & Bouché, Ind. Sem. Hort. Berol. 13. 1851. Linnaea 25:297. 1852.

Woody herbs up to 2½ m. tall, the glabrous branches erect and angled. Leaves lanceolate-elliptic, the apex acuminate, the base attenuate, 2–5 cm. broad, 4–14 cm. long. Racemes suberect, terminal or extra-axillary, 4–15 cm. long, the flowers fairly crowded; pedicels about 3.5–4.0 mm. long, the bracts about 4 mm. long, the bracteoles about 1 mm. long. Tepals oblong-elliptic, the apex rounded, white or pink, reflexed in fruit, 2–3 (–4) mm. long. Stamens 6–12 in 1 cycle, inserted on a subhypogynous disc, about 1.5–2.0 mm. long. Ovary subglobose, 6- to 8-carpellate, the carpels free at the apex, the styles equal to the number of carpels and free. Fruit a purple berry, 6–8 mm. in diameter.

In Panama, appearing at 1200–2000 meters; generally somewhat higher altitudes throughout the rest of the range, Mexico southwards to Colombia. The common name is *jaboncillo*.

BOCAS DEL TORO: Robalo Trail, northern slopes of Cerro Horqueta, *Allen 4998*. CHIRIQUÍ: trail from Paso Ancho to Monte Lirio, upper valley of Río Chiriquí Viejo, *Allen 1511*; *Seibert 302*; foot of Sierra del Boquete, *Maurice 742*; vicinity of Casita Alta, Volcán de Chiriquí, *Woodson, Allen & Seibert 975*; north forested face of Cerro Copete, eastern spur of Volcán de Chiriquí, *Allen 4871*; vicinity of Callejón Seco, Volcán de Chiriquí, *Woodson & Schery 480*; trail from Bambito to Cerro Punta, *Allen 311*.

P. rugosa is distinguished from *P. icosandra* by the incomplete union of the carpels, the shorter racemes, and the tendency towards fewer stamens and carpels. The free apices of the carpels may be observed equally well in flower or in fruit. The styles of the flower are fairly close together, but are definitely free and not connivent; in fruit they are pulled farther apart by the expansion of the seeds within the carpels. The staminal cycle is generally considered to be the inner one, the outer cycle having been suppressed. As in most species of *Phytolacca* the number of stamens is variable, fluctuating even between flowers of the same inflorescence.

2. **PHYTOLACCA ICOSANDRA** L. Syst. ed. 10. 1040. 1849.

Phytolacca malabarica Crantz, Inst. 2:484. 1769.
Phytolacca mexicana Crantz, loc. cit. 1769.
Phytolacca mexicana Gaertn. Fruct. 1:377. 1788.
Phytolacca triquetra Moench, Meth. Suppl. 107. 1802.
Phytolacca bogotensis HBK. Nov. Gen. et Spec. 2:183. 1823.
Phytolacca sessiliflora Kunth & Bouché, Ind. Sem. Hort. Berol. 15. 1848 Ann. Sci. Nat. III. 11:230. 1849.
Phytolacca acuminata Hort. ex Moq. in DC. Prodr. 13^2:33. 1849.
Phytolacca longespica Moq. loc. cit. 1849.
Phytolacca purpurascens A. Br. & Bouche, Ind. Sem. Hort. Berol. 13. 1851. Linnaea 25: 297. 1852.
Phytolacca macrostachya Willd. ex J. A. Schmidt, in Mart. Fl. Bras. 14^2:344. 1872.
Phytolacca nova-hispania Millsp. in Field Mus. Publ. Bot. 2:41. 1900.
Phytolacca icosandra var. *angustitepala* H. Walt. in Englr. Pflanzr. 4^{83}:61. 1909.
Phytolacca icosandra var. *sessiliflora* H. Walt. loc. cit. 1909.

Stout herbs 1–2 meters tall, sometimes rather succulent, with sharply angled and often pubescent branches. Leaves narrowly elliptic or sometimes ovate-elliptic, the apex acute, the base narrowed and decurrent along the petiole, 6.5–15 cm. long, 2.3–5.0 cm. broad. Inflorescence an elongate pubescent raceme of densely crowded flowers, 16–30 cm. long; pedicels 1–1.5 mm. long; bracts lanceolate-linear, 3–4 mm. long, the bracteoles about 0.8 mm. long. Tepals broadly elliptic or obovate, the apex rotund, pink, white, or sometimes greenish, occasionally pubescent, 2.5–3.5 mm. long. Stamens 8–20, inserted in 2 cycles on a disc at the base of the perianth, about 3 mm. long. Ovary 6–8 carpellate, the carpels completely united, the styles free but connivent, often recurved. Fruit a subglobose purple berry 6–8 mm. in diameter. Seed shiny black.

Mexico, the West Indies, Central America south to Ecuador. Most commonly found up to 1450 meters in Panama. The common name is *jaboncillo*.

BOCAS DEL TORO: Changuinola Valley, *Dunlap 401*.

The taxonomic controversy over this perplexing species has probably arisen from the variability of the distinguishing characters. The single most distinctive consideration which separates it from *P. rugosa* is that of whether or not the carpels of the ovary are entirely connate. To the unpracticed eye this is a tricky character, but it is the most reliable. The connivent styles are the best clue to the united carpels, as even in fruit they are closely clustered at the center of the berry in spite of the expansion of the ovary which would tend to pull them outwards. The remaining separative characters are best expressed as strong tendencies. The pedicels vary in length but in the Panamanian representatives are usually about 1 mm. long. The number of carpels may vary from flower to flower in the same inflorescence, but 8- to 9-carpellate ovaries are the most common. The racemes tend to be longer than those of *P. rugosa*, and the flowers are often more crowded.

Walter recognizes two varieties of which one, *P. icosandra* var. *sessiliflora* occurs in a limited range. The subsessile flowers he considers to be important enough to afford varietal status. By "subsessile" it is intended that the pedicel is about 1 mm. in length, as no specimens with a shorter pedicel were found. Nearly all individuals examined had pedicels of 1 mm. which would place them in this category, although the typical variety with a pedicel of about 3 mm. is reportedly widespread throughout Panama. Herbarium sheets from adjoining countries show a gradual tendency toward longer pedicels, and it is probable that this character is expressed by gradual variation, as are so many others.

3. **PHYTOLACCA RIVINOIDES** Kunth & Bouché, Ind. Sem. Hort. Berol. 15. 1848. Ann. Sci. Nat. III. 11:231. 1849.

Phytolacca icosandra Wright, Mem. 268. 1828, non Linn. (1759).
Phytolacca bogotensis Miq. Ser. exot. *t. 6.* 3. 1842, non HBK. (1823).
Phytolacca icosandra β Fraseri Moq. in DC. Prodr. 13²:33. 1849.
Phytolacca macrostachya Willd. ex Moq. loc. cit. 1849.
Phytolacca polystigma Benth. ex Moq. loc. cit. 1849.
Phytolacca acuminata Hort. ex Moq. loc. cit. 1849.
Phytolacca polystyla Schomb. ex Moq. loc. cit. 1849.

Woody herbs or weak shrubs up to 5 m. tall, with angled branches. Leaves ovate, elliptic, or even lanceolate, the apex mucronate, sometimes only acuminate, the base tending to be decurrent, 4.5–7.0 cm. broad, 9–17 cm. long, the petioles 0.9–4.5 cm. long. Racemes terminal or extra-axillary, the flowers uncrowded along the axis, 30–55 (–70) cm. long; pedicels 7–12 mm. long, the basal bract subulate, about 1.5 mm. long with 2 bracteoles above. Tepals white to red, sometimes cream, elliptic, about 2 mm. long, deciduous in fruit. Stamens 9–14 (–22), inserted on a hypogynous disc, about 2 mm. long. Ovary globose, 12- to 16-carpellate, the carpels united throughout their length, the styles as many as carpels, connivent, and recurved. Fruit a purple berry 5–6 mm. in diameter.

Throughout the West Indies; Mexico southwards to Bolivia. Found as high as 1680 meters, but generally below 1500 meters. The common name is *jaboncillo.*

BOCAS DEL TORO: Water Valley, *Von Wedel 833, 796*; Chiriquí Lagoon, *Von Wedel 2079, 2631, 1246, 2460, 2704*; Fish Creek Hills, *Von Wedel 2460*; Garay Creek, *2631*. CHIRIQUÍ: Bajo Chorro, Boquete district, *Davidson 153*. PANAMÁ: forests near Arraiján, *Woodson, Allen & Seibert 1392*. COLÓN: around Dos Bocas, Río Fató Valley, *Pittier 4205*. COCLÉ: El Valle de Antón, along Río Indio trail, *Hunter & Allen 313*.

Although *P. rivinoides* appears quite distinct from *P. icosandra* by virtue of its longer pedicels, deciduous tepals, more numerous carpels, smaller fruit and strikingly elongate racemes, nevertheless some specimens were examined which are suspiciously a mixture of greater or lesser degree of the two species. The most easily recognized clue to a questionable individual is a tendency for the pedicels to be longer than normal for *P. icosandra* and shorter than *P. rivinoides.* In combination with this character are usually found intermediate tendencies for raceme length, fruit size, and carpel number. It is interesting to note that even in plants showing extreme tendencies towards *P. rivinoides* the tepals are always persistent. Furthermore, the leaves of many of these intermediates are sometimes larger than found in either of the two species, although this is not always true.

3. MICROTEA Swartz

Microtea Swartz, Prodr. 53. 1788.

Schollera Rohr, in Skirvt, Naturhist. Selsk. Kjoeb. 2:210. 1792.
Ancistrocarpus HBK. Nov. Gen. et Sp. 2:186. *t. 122*. 1817.
Potamophila Schrank, Pl. Rar. Hort. Nom. 2. *t. 63*. 1819.
Ceratococca Willd. in Roem. et Schult. Syst. 6:800. 1820.
Aphanathe Link, Enum. Hort. Berol. 1:383. 1821.

Sprawling, decumbent or sometimes spreading annual herbs. Leaves alternate, simple, entire, petiolate or subpetiolate, exstipulate. Inflorescence extra-axillary or terminal, racemose, shortly pedicellate, bracteate. Flowers minute. Tepals 5, oblong, persistent and erect in fruit. Stamens 5, inserted at the base of the perianth, alternate with the tepals, the filament filiform, the anther dorsifixed.

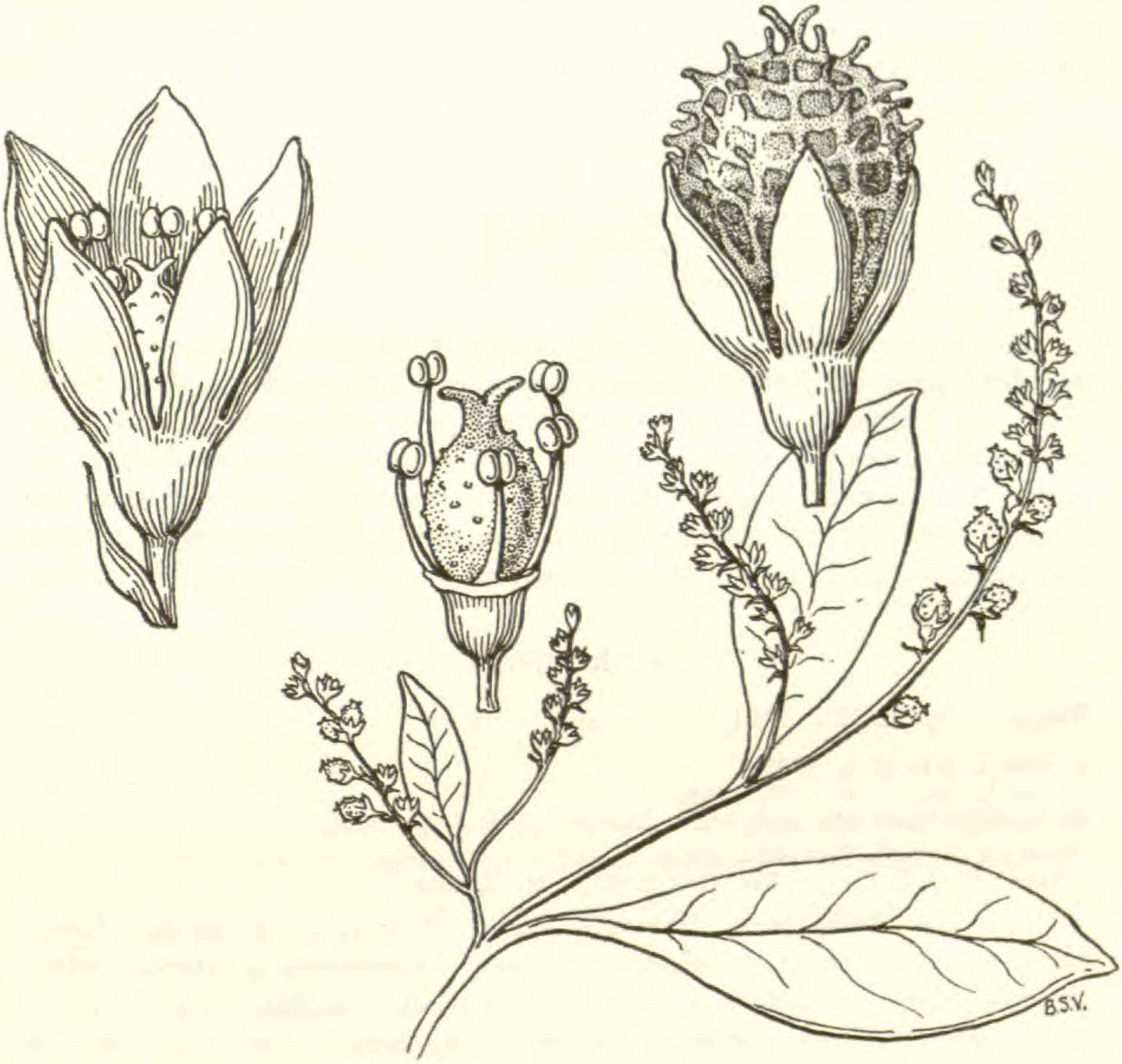

Fig. 129. *Microtea debilis*

Ovary globose, 2-carpellate, unilocular, the styles 2, basally connate, the ovule 1, basifixed. Fruit a minute drupe, tuberculate, the pericarp adherent to the seed. Seed 1, the testa crustaceous, the embryo bent, the albumen scanty.

About 9 species in the American tropics.

1. MICROTEA DEBILIS Sw. Prodr. 53. 1788.

Schollera debilis Rohr, in Skirvt, Naturh. Selsk. Kjoeb. 2:210. 1792.
Microtea ovata Delile, Hort. Monsp. 1827. ex Moq. in DC. Prodr. 13^{2}:17. 1849.
Microtea debilis α *ovata* Moq. loc. cit. 1849.
Microtea debilis β *rhombifolia* Moq. loc. cit. 1849.

Decumbent herbs to 50 cm., the stems sharply angled. Leaves elliptic to ovate, the apex acute, sometimes mucronate, the base attenuate, 1.0–2.3 cm. wide, 1.3–3.6 cm. long, glabrous. Inflorescence a many-flowered raceme 1.5–3.5 cm. long; bracts membranaceous, persistent, about 1 mm. long; pedicels about 1.0 mm. long. Tepals 5, lanceolate, white, about 0.5–0.7 mm. long. Stamens about 0.4 mm. long. Ovary globose, about 0.5 mm. in diameter. Fruit with the tubercles united into a honeycomb like pattern, 1.0–1.5 mm. in diameter.

Throughout the West Indies; from Guatemala southward to Peru and Brazil.

CANAL ZONE: Chagres, *Fendler 109*; hills between Río Grande and Pedro Miguel on road to Arraiján, *Pittier 2709*; Frijoles, *Standley 31470*; vicinity of Summit, *Standley 30145, 26968*; Balboa, *Standley 25826*; Gatún, *Bro. Heriberto 115*. BOCAS DEL TORO: Changuinola Valley, *Dunlap 402*. PANAMÁ: Chepo, *Pittier 4457*; Panama City, *Bro. Paul 166*; Taboga Island, *Standley 27088*; Exposición, *Bro. Heriberto 277*. DARIÉN: Boca de Cupe, *Allen 883*.

Microtea is a striking genus not only because of the extremely minute flowers, but also because the flowers seem to demonstrate a very much simplified flower plan. The relationship of *Microtea* to the rest of the family is obvious but it also suggests close affinity to some members of the Chenopodiaceae, particularly to the genus *Chenopodium*. Although the number of stamens are usually equal to and alternate with the petals, occasionally 8 stamens will be found irregularly inserted. The tubercles vary in length, and although usually rather short, may be as long as 0.5 mm.

4. RIVINA L.

RIVINA L. Sp. Pl. 121. 1753.

Tithona L. Syst. ed. 1. 1735.
Rivinia L. Gen. Pl. ed. 5. 57. 1754.
Piercea Mill. Gard. Dict. ed. 7. 1759.
Solanoides Moench, Meth. 307. 1794.
Tithonia L. ex O. Kuntze, Rev. Gen. 2:552. 1891, sphalm.

Tall often woody herbs, frequently shrub-like, erect or straggling. Leaves alternate, simple, entire, petiolate, exstipulate. Inflorescence a suberect many-flowered terminal or axillary raceme. Flowers small, pedicellate. Tepals 4, subequal, obovate-oblong, rounded or pointed at the apex, persistent and erect or spreading in fruit. Stamens 4, inserted at the base of the perianth in 1 cycle alternate with the tepals, the filaments free, the anther dorsifixed. Ovary

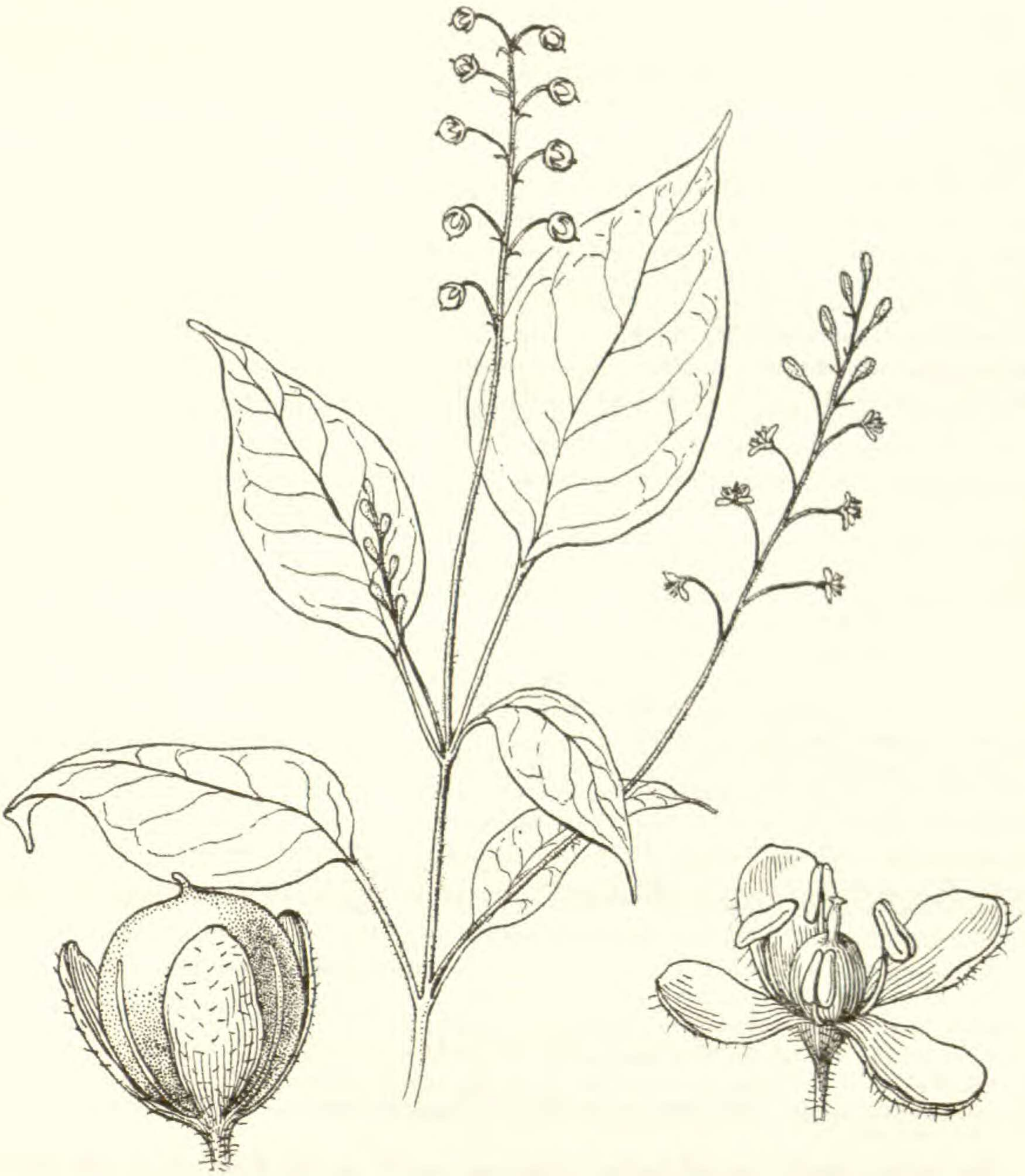

Fig. 130. *Rivina humilis*

1-carpellate, the style subterminal, short, curved, the stigma capitate, the ovule 1. Fruit a globose red berry, the pericarp adherent to the seed, the testa crustaceous.

Three species in the American tropics and subtropics, introduced into Asia and Australia.

1. Rivina humilis L. Sp. Pl. 122. 1753.

Rivina humilis α canescens L. Sp. Pl. 122. 1753.
Rivina humilis δ glabra L. loc. cit. 1753.
Rivina laevis L. Mant. 41. 1767.
Piercea glabra Mill. Gard. Dict. ed. 8. *Piercea* no. 1. 1768.
Piercea tomentosa Mill. Gard. Dict. ed. 8. *Piercea* no. 2. 1768.
Rivina viridis Schmidt, in Mayer, Samml. Phys. Aufs. 1:185. 1791.
Rivina brasiliensis Nocca, in Usteri. Ann. Bot. 6:63. 1793.
Solanoides pubescens Moench, Meth. 307. 1794.
Solanoides laevis Moench, loc. cit. 1794.
Rivina pallida Salisb. Prod. 67. 1796.
Rivina gracilis Salisb. loc. cit. 1796.
Solanoides undulata Moench, Meth. Suppl. 106. 1802.
Rivina lanceolata Willd. Enum. Hort. Berol. Suppl. 8. 1813.
Rivina tetrandra Desfl. Tabl. ed. 2. 49. 1815.
Rivina puberula HBK. Nov. Gen. & Sp. 2:184. 1817.
Rivina tinctoria Ham. ex G. Don. in Loud. Hort. Brit. Suppl. 1:598. 1832.
Rivina portulaccoides Nutt. in Trans. Am. Phil. Soc. II. 5:167. 1837.
Rivina acuminata Raf. New Fl. 4:13. 1838, non HBK. (1817).
Piercea acuminata Raf. loc. cit. 1838.
Rivina obliquata Raf. loc. cit. 1838.
Piercea obliquata Raf. loc. cit. 1838.
Rivina canescens G. Don. in Steud. Nom. Bot. ed. 2. 2:460. 1841.
Rivina laevis β acuminata Moq. in DC. Prodr. 13^2:12. 1849.
Rivina orientalis Moq. loc. cit. 1849.
Rivina procumbens Ruiz, ex Moq. loc. cit. 13. 1849.
Rivina humilis α puberula (HBK.) Moq. loc. cit. 1849.
Rivina humilis β canescens (G. Don.) Moq. loc. cit. 1849.
Rivina humilis γ plumbaginifolia Willd. ex Moq. loc. cit. 1849.
Rivina aurantiaca Warsz. ex Schenk, Ind. Sem. Werceburg. 1861.
Rivina laevis var. *pubescens* Griseb. Fl. Brit. W. Ind. 59. 1864.
Rivina viridiflora Bel, Anal. Soc. Esp. Hist. Nat. 12:105. 1883.
Rivina paraguayensis Parodi, in Anal. Soc. Cient. Argent. 5:206. 1878.
Tithonia humilis O. Kuntze, Rev. Gen. 552. 1891.
Tithonia humilis var. *canescens* f. *albiflora* O. Kuntze, loc. cit. 1891.
Tithonia humilis var. *glabra* O. Kuntze, loc. cit. 1891.
Rivina humilis laevis Millsp. in Field Mus. Publ. Bot. 2:41. 1900.
Rivina humilis var. *orientalis* (Moq.) H. Walt. in Engl. Pflanzenr. 4^{83}:105. 1909.

Straggling shrubs or tall herbs sometimes woody at the base, up to 10 meters high. Leaves elliptic to ovate or lanceolate, the apex acute to acuminate, the base rounded or truncate, 2–6 cm. wide, 4–12 cm. long; petioles 0.6–11.0 cm. long. Flowers small, drooping; pedicels 3 mm. in flower, elongating to about 7 mm. in fruit; bracts lanceolate, about 2 mm. long; tepals 4, white or pinkish white, 2.0–3.5 mm. long; stamens 4, inserted at the base of the perianth, about 1.5 mm. long. Fruit a scarlet or red berry, about 4.0–4.5 mm. in diameter.

Florida to Oklahoma and Texas; throughout Mexico and southward to Argentina; West Indies. In Costa Rica found up to 1040 meters elevation. Particularly common on waste ground, often on coastal rocks. Among the common names are Wild Tomato, Bloodberry, and *carmin*.

BOCAS DEL TORO: region of Almirante, *Cooper 77*; location not stated, *Carleton 52*; vicinity of Nievecita, *Woodson & Schery 1023*; *Woodson, Allen & Seibert 1807*; Water

Valley, *Von Wedel 609*; Chiriquí Lagoon, vicinity of Little Bocas, *Von Wedel 2526*; vicinity of Chiriquí Lagoon, Big Bight, *Von Wedel 2882*. CHIRIQUÍ: valley of upper Río Chiriquí Viejo, *P. & G. White 88*. COCLÉ: mountains beyond La Pintada, *Hunter & Allen 579*. DARIÉN: near mouth of Río Yapé, *Allen 336*; vicinity of Boca de Cupe, *Allen 889*.

Walter recognizes three varieties of *Rivina humilis* based on glabrity or degree of pubescence. *R. humilis* var. *orientalis* is in Asia, presumably escaped from cultivation as the genus is probably not indigenous to the region. *R. humilis* var. *canescens* is recognized by the tomentose stems and densely pilose leaves and petioles, and is cited as found in Brazil and the lesser Antilles. *R. humilis* var. *glabra* is, as the names implies, completely glabrous, and is widely distributed from Texas to Argentina. Use of pubescence as a distinguishing varietal character is unconvincing; consequently the specimens examined have been treated as a single species with a wide range of variation in the degree of relationship between pubescence and glabrity of any part of a plant. The synonymy has likewise been regarded as pertaining to a single species.

5. TRICHOSTIGMA A. Rich.

TRICHOSTIGMA A. Rich. in Sagra, Hist. Cuba 10:306. 1845.

Villamilla R. & B. ex Benth. & Hook. Gen. Pl. 3:81. 1880.

Woody vines, shrubs. Leaves alternate, simple, entire, petiolate; stipules minute and deciduous. Inflorescence a many-flowered terminal or extra-axillary raceme, the bracts deciduous. Tepals 4, subequal, persistent and reflexed in fruit. Stamens 8–10 (–12), inserted on a hypogynous disc, the filaments free, the anther dorsifixed. Ovary 1-carpellate, unilocular, subglobose, the stigma sessile or subsessile, often penicillate, the ovule 1. Fruit a globose drupe, the pericarp adherent to the seed. Seed 1, the testa crustaceous.

Three species in tropical America.

a. Flowers in crowded condensed racemes; stamens 8–12; pedicels 7–9 mm. long........................ 1. T. OCTANDRUM
aa. Flowers in elongate lax racemes; stamens 20–25; pedicels 8–16 mm. long........................ 2. T. POLYANDRUM

1. **TRICHOSTIGMA OCTANDRUM** (L.) H. Walt. in Engl. Pflanzenr. 4^{83}:109. 1909.

Rivina humilis β scandens L. Sp. Pl. 122. 1753.
Rivina octandra L. Cent. Pl. 2:9. 1756.
?*Rivina dodecandra* Jacq. Obs. Bot. 1:6. 1764.
Rivina scandens Mill. Gard. Dict. ed. 8. *Rivinia* no. 2. 1768.
Rivina Mutisii Willd. ex Schult. Mant. 3:305. 1827.
Rivina americana Raf. Fl. Tell. 3:56. 1837.
Trichostigma rivinoides A. Rich. in Sagra. Hist. Cuba. 10:306. 1845.
Rivina octandra β obtusifolia Moq. in DC. Prodr. 13^2:11. 1849.
Rivina Ehrenbergiana Klotzsch, ex Moq. loc. cit. 1849.
Rivina Moritziana Klotzsch, ex Moq. loc. cit. 1849.
Villamilla octandra Hook. f. in Benth. & Hook. Gen. Pl. 3:81. 1880.

Decumbent or suberect shrubs or woody vines up to 10 meters. Leaves oblong to elliptic, the apex acute to acuminate, the base rounded or acute, 3.8–5.5 cm. broad, 12.4–14.7 cm. long; petioles 2.4–3.7 cm. long, glabrous. Inflorescence a

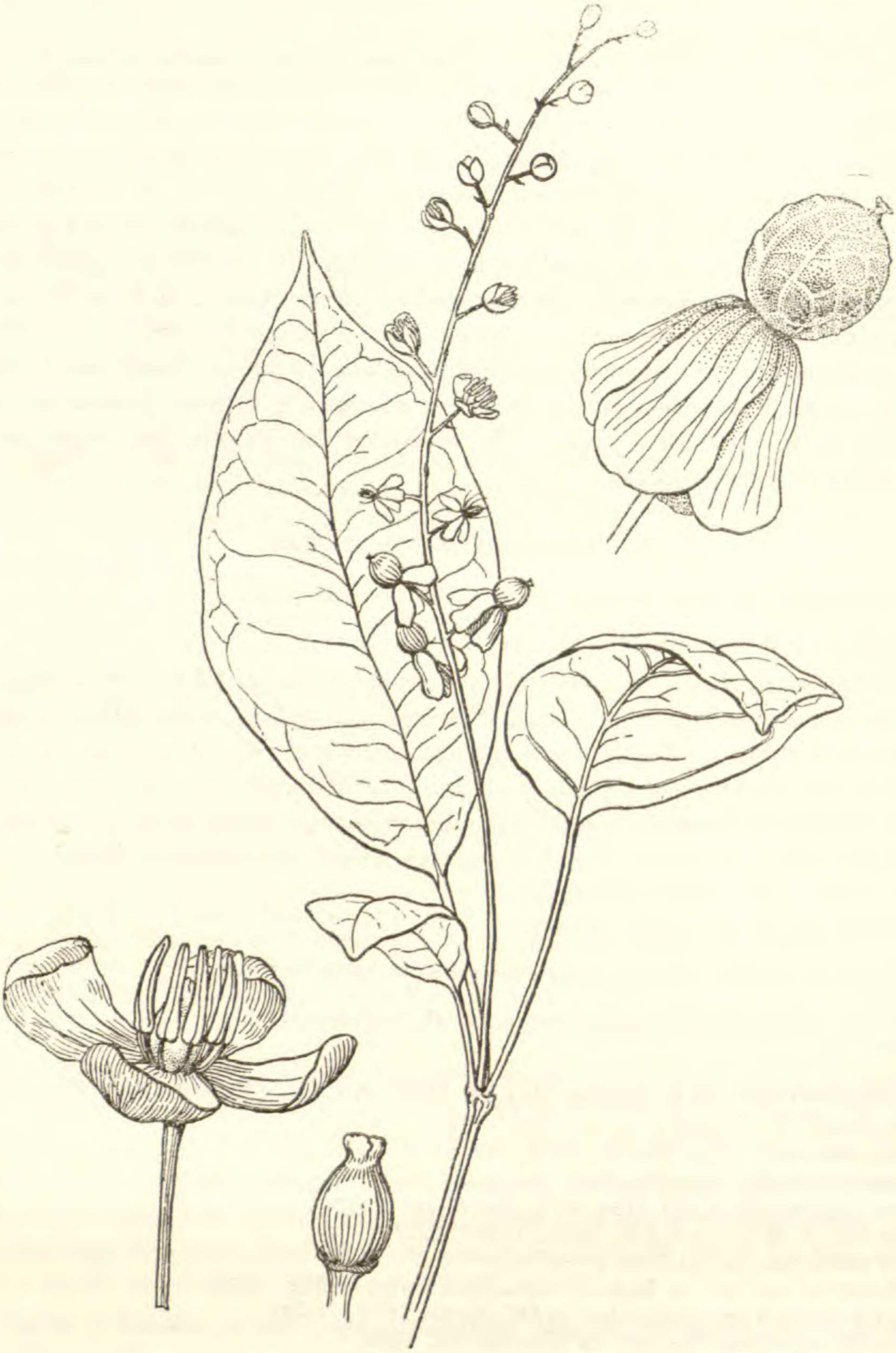

Fig. 131. *Trichostigma polyandrum*

fairly dense many-flowered raceme, about 5.0–6.5 (–11.0) cm. long; pedicels 3–9 mm. long; bracts lanceolate, 2 mm. long, deciduous, the bractlets triangular, 0.5 mm. long. Tepals white to whitish-green, 2–3 mm. long. Stamens 8–12, inserted irregularly at the base of the perianth, 3–4 mm. long. Fruit a subglobose drupe, black, 5.5–6.0 mm. in diameter.

United States (southern peninsular Florida and the Keys); West Indies; throughout Mexico and Central America; South America (Venezuela to Argentina); common in abandoned fields and moist woods.

CANAL ZONE: drowned forest of upper Río Pequeni between Salamanca Hydrographic Station and Río Boquerón, *Allen 17279*. DARIÉN: Tucuti, *M. E. & R. A. Terry 1396*.

The Terrys have stated on the specimen label that *T. octandrum* is a tree, but there are no other indications that trees are even found in this genus. *T. octandrum* occurs as a woody shrub or liana sprawling over adjacent shrubs and trees.

2. TRICHOSTIGMA POLYANDRUM (Loesener) H. Walt. in Engl. Pflanzenr. 4^{83}:112. 1909.

Rivina polyandra Loesener, in Engl. Bot. Jahrb. 23:123. 1896.
Villamilla polyandra H. Walt. loc. cit. 37: Beibl. 83:24. 1906.

Weak shrubs up to 5 meters, or woody vines climbing on shrubs. Leaf blades elliptic to ovate, the apex acute to attenuate, the base rounded or acute, 7.0–16.8 cm. long, 3.5–6.6 cm. broad, the petioles 1.0–3.0 cm. long, glabrous. Inflorescence a long uncrowded raceme, about 8.0–21.0 cm. long; pedicels 8–16 mm. long; bracts lanceolate, 1.5–2.0 mm. long, deciduous, the bractlets about 0.5 mm. long. Tepals white in flower, red, purple or purplish-pink in fruit, 4.0–9.0 mm. long. Stamens 20–25 inserted at the base of the perianth. Ovary subglobose, the style very short. Fruit a drupe, purple or red, 4.5–5.5 mm. in diameter.

Central America (Nicaragua, Costa Rica and Panama).

BOCAS DEL TORO: Pumpkin River near Chiriquí Lagoon, *Von Wedel 2571*; Water Valley, *Von Wedel 926, 1439, 714, 1547, 940*; *Woodson, Allen & Seibert 1832*; Almirante, *Cooper 133*. PANAMÁ: Río Juan Díaz above Juan Díaz, *Allen 944*.

Trichostigma appears to have close affinities with *Rivina*. However the two may easily be distinguished by the more numerous stamens, the tepals reflexed in fruit, the terminal stigma, the deciduous stipules, and the drupaceous fruit of *Trichostigma*. The genera have been treated as one genus by some authors, but recently they have been regarded as separate.

AIZOACEAE

BY LORIN I. NEVLING, JR.

Annual or perennial herbaceous or suffruticose plants, prostrate or upright, often succulent. Leaves usually simple, alternate, opposite or pseudoverticellate, often fleshy, sometimes reduced to scales, entire; stipules scarious or absent. Inflorescences axillary or terminal, modified cymes or the flowers solitary. Flowers bisexual, polygamodioecious or unisexual, actinomorphic, often small. Perianth monochlamydeous, usually 4- or 5-parted, free or connate, sometimes appendaged on the outer surface, often persistent in fruit. Stamens (3), 4, 5 or many, the outermost often sterile and petaloid (but not in our species), the filaments free or variously connate at the base into fascicles or into a monadelphous sheath, free or adnate to the perianth, the anthers oblong or linear, small, dehiscing longitudinally. Pistil 1, the ovary superior to inferior, 1–5 (–20) loculate, the placentation axile, parietal or basal, the ovules solitary to many per locule, anatropous or campylotropous, the styles as many as the locules. Fruit a loculicidal or circumscissile capsule or indehiscent and either baccate or nut-like; seed with mealy endosperm, sometimes strophiolate, the embryo curved.

A large weedy family particularly well-developed in South Africa. Three genera are represented in Panama, each by a single species. A fourth genus, *Glinus,* with a single species [*G. radiatus* (Ruiz & Pav.) Rohrb.] has been reported from Panama. I have been unable to locate a voucher for this record but have included the genus in the key to genera.

This study is based primarily on the work of F. Pax and K. Hoffman (in Natur-Pflanzenf. 16^c:179–233. 1934) and P. Wilson (in North Amer. Fl. 21:267–277. 1932).

a. Leaves basal or pseudoverticellate, not fleshy; tepals distinct to the base or nearly so, with or without appendages on the outer surface beneath the apex; fruit a loculicidal capsule, 3- to 5-loculate; seeds strophiolate or estrophiolate.

  b. Plants glabrous; leaves generally linear; flowers pedicellate; tepals distinct to the base, without appendages; seeds estrophiolate......... 1. MOLLUGO

  bb. Plants tomentulose; leaves obovate, oblanceolate or rounded-spatulate; flowers sessile or short-pedicellate; tepals distinct to the base or nearly so, with appendages; seeds strophiolate..................... GLINUS

aa. Leaves opposite, fleshy; tepals connate, with appendages on the outer surface beneath the apex; fruit a circumscissile capsule, 1- to 5-loculate; seeds estrophiolate.

  c. Leaves obovate to rounded-spatulate, strikingly unequal; ovary 1- or 2-loculate; styles 1 or 2; seeds few.. 2. TRIANTHEMA

  cc. Leaves linear, elliptic or narrowly obovate, more or less equal; ovary 3- to 5-loculate; styles 3 to 5; seeds numerous...................... 3. SESUVIUM

1. MOLLUGO L.

MOLLUGO L. [Gen. 356. 1737]; Sp. Pl. 89. 1753.

Galiastrum Heist. ex Fabricius, Enum. Pl. Hort. Helmst. 108. 1759.
Lampetia Raf. Fl. Tellur. 3:34. 1836.

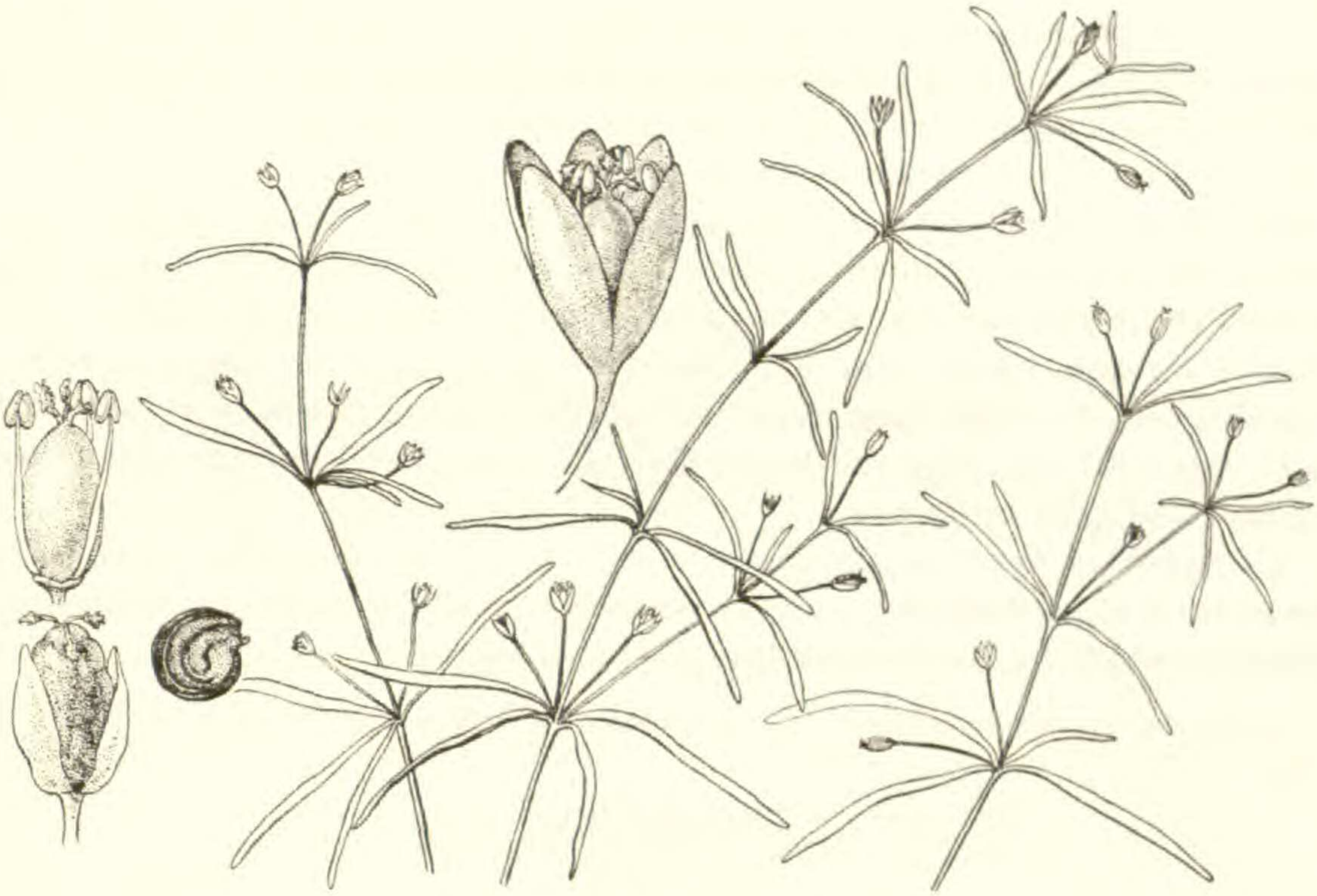

Fig. 132. ***Mollugo verticellata***

Herbaceous or suffruticose plants, glabrous throughout. Leaves simple, basal or pseudoverticellate, generally linear; stipules deciduous. Inflorescences axillary, cymose. Flowers bisexual, pedicellate. Perianth 5-parted, distinct to the base, imbricate, scarious at the margins, lacking appendages. Stamens 3–10, united at the base. Ovary superior, 3- to 5-loculate, the ovules campylotropous, numerous on the axile placenta. Capsule loculicidal; seeds generally numerous, small, estrophiolate.

About 25 species in the temperate and tropical regions of both hemispheres.

1. Mollugo verticellata L. Sp. Pl. 89. 1753.

Pharnaceum hoffmannseggianum Roem. & Schult. Syst. Veg. 6:692. 1820.
Mollugo dichotoma Schrank, Pl. Rar. Hort. Monac. *t. 64.* 1821.
Mollugo arenaria HBK. Nov. Gen. & Sp. 6:20. 1823.
Mollugo hoffmannseggiana (Roem. & Schult.) Ser. in DC. Prod. 1:393. 1824.
Mollugo schrankii Ser. loc. cit. 391. 1824.
Pharnaceum verticellatum (L.) Spreng. Syst. 1:949. 1825.
Pharnaceum arenarium (HBK.) Spreng. loc. cit. 1825.
Mollugo juncea Fenzl, in Ann. Wien Mus. 1:378. 1836.
Mollugo diffusa Willd. ex Fenzl. loc. cit. 377. 1836, nom. nud. in syn.
Mollugo spergulaefolia Willd. ex Fenzl, loc. cit. 378. 1836, nom. nud. in syn.
Mollugo triphylla Schrank, ex Steud. Nom. ed. 2. 2:154. 1841, nom. nud. in syn.
Mollugo gracillima Anders. in Vet. Akad. Handl. Stockh. 1853:226. 1855.
Pharnaceum cerviana Mart. ex Rohrb. in Mart. Fl. Bras. 14^2:241. 1872, non L., nom. nud. in syn.
Mollugo axillaris Schlecht. ex Rohrb. loc. cit. 242. 1872, nom. nud. in syn.

Annuals, prostrate to ascending, often falsely dichotomously branched. Leaves pseudoverticellate, 3–6 per node, unequal, generally oblong-linear, 1–3 cm. long, 1–2 mm. broad, more or less acute at the apex, gradually tapered to the base; sessile. Inflorescence axillary, modified cymose; pedicel 3–5 mm. long. Flowers with the tepals elliptic, about 2.0–2.5 mm. long, 0.5–0.75 mm. broad, persistent and subtending the fruit, glabrous; stamens 3, the filaments filiform, to 2 mm. long, connate at the very base, the anthers ovoid, about 0.25 mm. long and broad; ovary ovoid, 3-loculate, 1.0–1.5 mm. long, the styles 3, 0.5–0.75 mm. long, spreading. Capsule ovoid, 2–3 mm. long, about 1.5 mm. in diameter; seeds numerous, reniform, about 0.5 mm. long and broad, the testa with several distinct ridges along the back and sides, brown.

Cosmopolitan weeds in the temperate and tropical regions of the world. This species has a rather large and complex synonomy involving numerous infraspecific categories which are not included here in the synonymy.

CANAL ZONE: Chagres, *Fendler 11*. PANAMÁ: San José Island, *Johnston 1232*.

2. TRIANTHEMA L.

TRIANTHEMA L. Sp. Pl. 223. 1753.

Reme Adans. Fam. 2:245. 1763.
Zaleya Burm. f. Fl. Ind. 110, *t. 31*. 1768.
Papularia Forsk. Fl. Aegypt.-Arab. 69. 1775.
Rocama Forsk. loc. cit. 71. 1775.
Portulacastrum Juss. ex Medic. Phil. Bot. 1:99. 1789.
Zallia Roxb. Fl. Ind. 3:74. 1832.
Ancistrostigma Fenzl, in Ann. Wien Mus. 2:293. 1839.
Racoma Willd. ex Steud. Nom. ed. 2. 2:429. 1841.
Zaleia Steud. loc. cit. 795. 1841.
Pomatotheca F. Müll. Fragm. 10:72. 1876.

Herbaceous or suffruticose plants, branched, upright or prostrate. Leaves simple, opposite, strikingly unequal, fleshy, obovate to rounded-spatulate, the petioles connate into a petiolar sheath surrounding the stem; stipulate. Inflorescences axillary, cymose or the flowers solitary. Flowers bisexual, sessile or pedicellate. Perianth 5-parted, connate below, the lobes appendaged on the outer surface beneath the apex, imbricate. Stamens 5 or more, inserted on the perianth tube or free and monadelphic. Ovary superior, 1- or 2-loculate, the ovules campylotropous, few on the axile placenta, the styles 1 or 2. Capsule circumscissile; seeds few, reniform, the testa often wrinkled, estrophiolate.

About 15 species of the tropics and subtropics.

1. **TRIANTHEMA PORTULACASTRUM** L. Sp. Pl. 223. 1753.

Trianthema monogynum L. Mant. 69. 1767.
Trianthema procumbens Mill. Gard. Dict. ed. 8. no. 1. 1768.
Portulacastrum monogynum (L.) Medic. Phil. Bot. 1:99. 1789.
Trianthema flexuosa Schum. & Thonn. Beskr. Guian. Pl. 241. 1828.

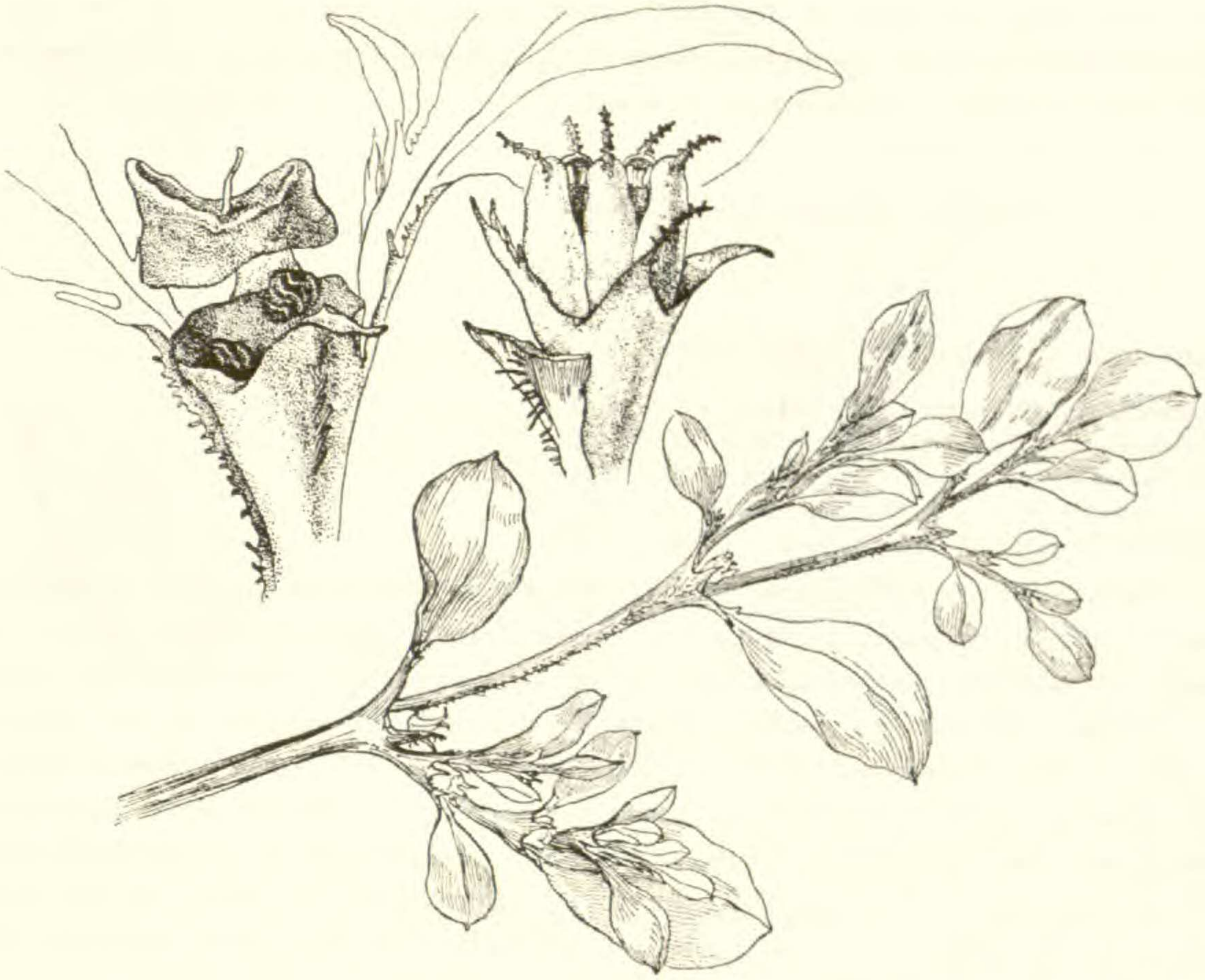

Fig. 133. *Trianthema portulacastrum*

Herbaceous annuals, erect or prostrate, the young stems sometimes with a decurrent line of hairs from the interpetiolar stipules to the node below and glabrescent, often alternately branched by the development of the axillary bud subtended by the smaller leaf of the nodal pair. Leaves of any pair strikingly unequal, the larger at least twice as large as the smaller, obovate to rounded-spatulate, 1–3 cm. long, 0.5–2.0 cm. broad, acute, obtuse, retuse and often mucronulate at the apex, cuneate at the base, glabrous above and below; petiole 0.3–1.5 cm. long, at the base connate into a sheath surrounding the stem, the interpetiolar stipule deltoid, 1–2 mm. long, remotely serrate or entire. Inflorescence with the flowers solitary; sessile. Flowers with the perianth tube campanulate, often intimately associated with the petiolar sheath of the subtending leaves, the lobes lanceolate, about 1.5 mm. long, 1 mm. broad, glabrous, appendage horn-like, barbed about 0.75 mm. long; stamens 10, inserted at the orifice of the perianth tube, the filaments filiform, about 1.5 mm. long, glabrous, the anthers ovoid, about 0.5 mm. long and broad; ovary turbinate, about 1 mm. long, 1 mm. in diameter, truncate and irregularly fleshy-lobed at the apex, glabrous, the style 1, about 1 mm. long. Capsule almost enclosed in the petiolar sheath, turbinate, about

4.5 mm. long, 3.5 mm. in diameter, sessile, truncate and crested at the apex, circumscissile at about the middle; seeds 2–5, reniform, 1.5–1.75 mm. in diameter, the testa wrinkled, reddish-brown to black.

A pantropic species.

CANAL ZONE: Fort Clayton, *Standley 29003*.

3. SESUVIUM L.

SESUVIUM L. Syst. ed. 10. 1058. 1759.

Squibbia Raf. New Fl. 4:16. 1838.
Diplochonium Fenzl, Nov. Stirp. Dec. 57. 1839.
Pyxipoma Fenzl, in Ann. Wien Mus. 2:293. 1839.
Psammanthe Hance, in Walp. Ann. 2:659. 1852.
Halimus O. Ktze. Rev. Gen. 1:263. 1891.

Herbaceous or suffruticose plants, upright or prostrate, sparsely branched. Leaves simple, opposite, more or less equal, fleshy, generally linear, elliptic or narrowly obovate, the petioles clasping or connate and surrounding the stem; estipulate. Inflorescence axillary or rarely terminal, glomerules or the flowers solitary. Flowers bisexual, sessile or pedicellate. Perianth 5-parted, connate below, the lobes generally appendaged on the outer surface beneath the apex, imbricate. Stamens 5, free and alternitepalous, or numerous, and inserted on the perianth tube. Ovary superior, 3- to 5-loculate, the ovules campylotropous, many on the axile placenta, the styles 3 to 5. Capsule circumscissile; seeds numerous, reniform, the testa smooth, estrophiolate.

Six to eight species, tropical and subtropical strand plants of both hemispheres.

1. SESUVIUM PORTULACASTRUM (L.) L. Syst. Nat. ed. 10. 1058. 1759.

Portulaca portulacastrum L. Sp. Pl. 446. 1753.
Sesuvium revolutifolium Ortega, Dec. 19. 1797.
Sesuvium ortegae Spreng. Bot. Gart. Halle Nachtr. 1:36. 1801.
Sesuvium pedunculatum Pers. Syn. Pl. 2:39. 1806.
Sesuvium sessile Pers. loc. cit. 1806.
Sesuvium sessiliflorum Domb. ex Rohrb. in Mart. Fl. Bras. 14^2:310. 1872, nom. nud. in syn.
Halimus portulacastrum (L.) O. Ktze. Rev. Gen. 1:263. 1891.

Herbaceous perennials, glabrous throughout, the branches trailing and often rooting at the nodes, sometimes rather stout. Leaves linear, elliptic or narrowly obovate, 1–5 cm. long, 0.2–1.0 cm. broad, subacute to acute at the apex, gradually tapered to the base; petiole 1–5 mm. long, dilated at the base and clasping the stem but the sheaths not connate. Inflorescence axillary, the flowers solitary, pink; pedicel 2–11 mm. long. Flowers with the perianth tube obconic to subcampanulate, 1.5–3.0 mm. long, the lobes ovate, 4–7 mm. long, 3.0–4.5 mm. broad, somewhat auriculate at the perianth tube orifice, persistent and somewhat reflexed in fruit, appendage horn-like, 1.0–1.5 mm. long; stamens numerous, inserted at the orifice of the perianth tube, free or subconnate, the filaments 1.5–3.5 mm. long, gradually tapering to the apex, the anthers oblong, 0.5–0.75 mm. long, 0.25–0.5 mm. broad; ovary ovoid to subglobose, 3.0–3.5 mm. long, 2.5–3.0 mm. in diameter,

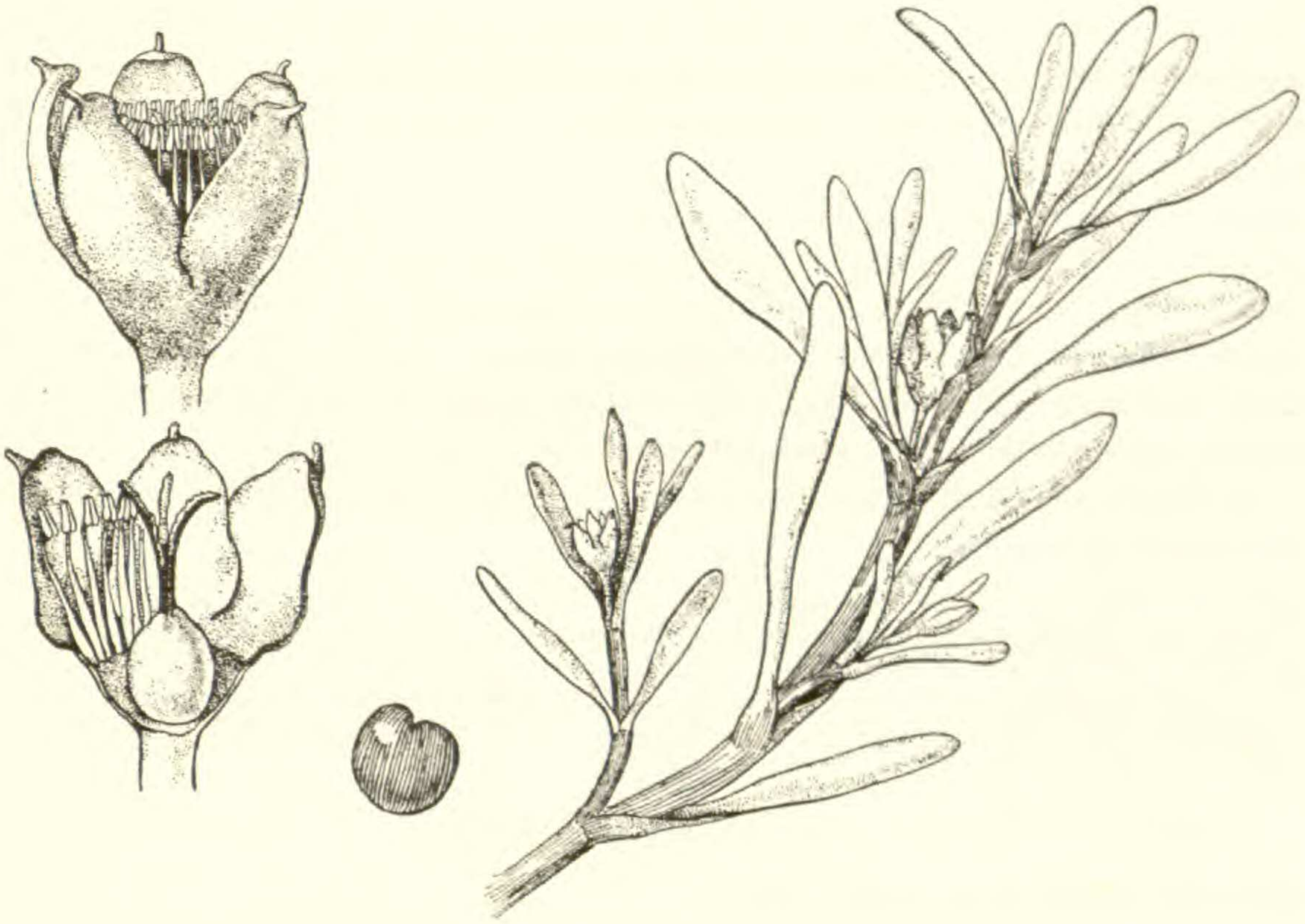

Fig. 134. *Sesuvium portulacastrum*

the styles 3 or 4, 1.5–3.5 mm. long spreading or erect. Capsule ovoid or obovoid, about 6.5 mm. long, 3 mm. in diameter, circumscissile below the middle; seeds 8–30, lenticular-reniform, about 1.0–1.5 mm. in diameter, the testa smooth, black.

Circumtropical.

BOCAS DEL TORO: bar mouth, Changuinola Valley, *Dunlap 139, Stork 139*. CANAL ZONE: Cristóbal, *Artamanoff s. n.*; Balboa, *Standley 25625, 30882*; railroad and dock yards at Balboa, *Macbride & Featherstone 24*; vicinity of Fort Sherman, *Standley 31180*. COLÓN: vicinity of Palenque, *Pittier 4118*. PANAMÁ: Pearl Islands, *Johansen 111*; Saboga Island, *Allen 2634, Miller 1965*; near Punta Paitilla Military Reservation outskirts of Panama City, *Bro. Maurice 754*; San José Island, *Erlanson 173*. SAN BLAS: forests around Puerto Obaldía, *Pittier 4400*.

PORTULACACEAE

By LORIN I. NEVLING, Jr.

Herbs, subshrubs or shrubs, more or less succulent, often glabrous. Leaves alternate, opposite or in basal rosettes, simple, terete, subterete or plane, often fleshy, pinnately veined; stipules scarious, fimbriate, tufted or rarely absent. Inflorescence terminal or axillary, paniculiform, racemose, cymose or the flowers solitary. Flowers bisexual, often insignificant. Sepals (involucral bracts) 2 or rarely 4–8, connate at the base or free, persistent or caducous, scarious or herbaceous, imbricate. Petals (tepals) 4–5 or rarely fewer or more, connate at the base or free, deciduous or rarely calyptrate, imbricate. Stamens often as many as the petals and opposite them, sometimes fewer or more, free or basally adnate to the corolla, the filaments filiform, the anthers 2-celled, dehiscing longitudinally, introrse. Pistil 1; ovary superior to inferior, becoming uniloculate, the placentation central, basal, the ovules (1–) 2–many, campylotropous; styles and stigmas 1–9, united below or free. Fruit capsular, circumscissily or loculicidally dehiscent, rarely indehiscent and nut-like; seeds 1–many, generally reniform-round, compressed, the embryo curved, endosperm mealy.

A family of weedy plants composed of 15–25 genera. Only 2 genera are represented in Panama.

a. Leaves estipulate; ovary superior; styles 3; capsule loculicidal, 3-valved, splitting from the apex towards the base.................................... 1. TALINUM
aa. Leaves stipulate or estipulate, the stipules scarious, fimbriate or tufted; ovary half to wholly inferior; styles 1–9; capsule circumscissile.. 2. PORTULACA

1. TALINUM Adans.

TALINUM Adans. Fam. 2:245. 1763.

Helianthemoides Medik. Phil. Bot. 1:95. 1789.
Phemeranthus Raf. in Med. Repos. N. Y. 5:350. 1808.
Talinium Raf. in Amer. Monthly Mag. 175. 1818.
Litanum Nieuwl. in Amer. Midl. Nat. 4:90. 1915.

Herbs, subshrubs or shrubs, often succulent. Leaves alternate or approximate, terete to plane, fleshy; estipulate. Inflorescence terminal or rarely axillary, paniculiform, cymose or the flowers solitary. Sepals 2, opposite, deciduous or rarely persistent. Petals 5, rarely more, connate at the base or free, deciduous. Stamens 5–30, in antipetalous fascicles. Ovary superior, sessile or short-stipitate, the ovules numerous, the styles 3, more or less united, filiform. Capsule loculicidal, 3-valved, splitting from the apex to the base, chartaceous; seeds reniform-round, numerous, the embryo incompletely annular, the testa smooth, striate or tuberculate, distinctly or indistinctly strophiolate.

A genus of about 50 species of which only 1 is found in Panama.

1. TALINUM PANICULATUM (Jacq.) Gaertn. Fruct. 2:219. 1791.

Portulaca paniculata Jacq. Enum. Pl. Carib. 22. 1760.
Portulaca patens L. Mant. 242. 1771.
Roelingia patens (L.) Ehrh. Beitr. 3:135. 1788.
Talinum reflexum Cav. Ic. 1:1. 1791.
Talinum dichotomum Ruiz & Pav. Syst. Veg. 118. 1798.
Talinum patens (L.) Willd. Sp. Pl. 2:863. 1800.
Portulaca reflexa (Cav.) Haw. Misc. Nat. 141. 1803.
Talinum fruticosum Macfad. Fl. Jam. 2:169. 1850.
Talinum sarmentosum Englm. in Bost. Journ. Nat. Hist. 6:153. 1850.
Talinum spathulatum Englm. in Gray, Pl. Wright. 1:14. 1852.
Talinum purpureum Hort. ex Englm. loc. cit. 1852.

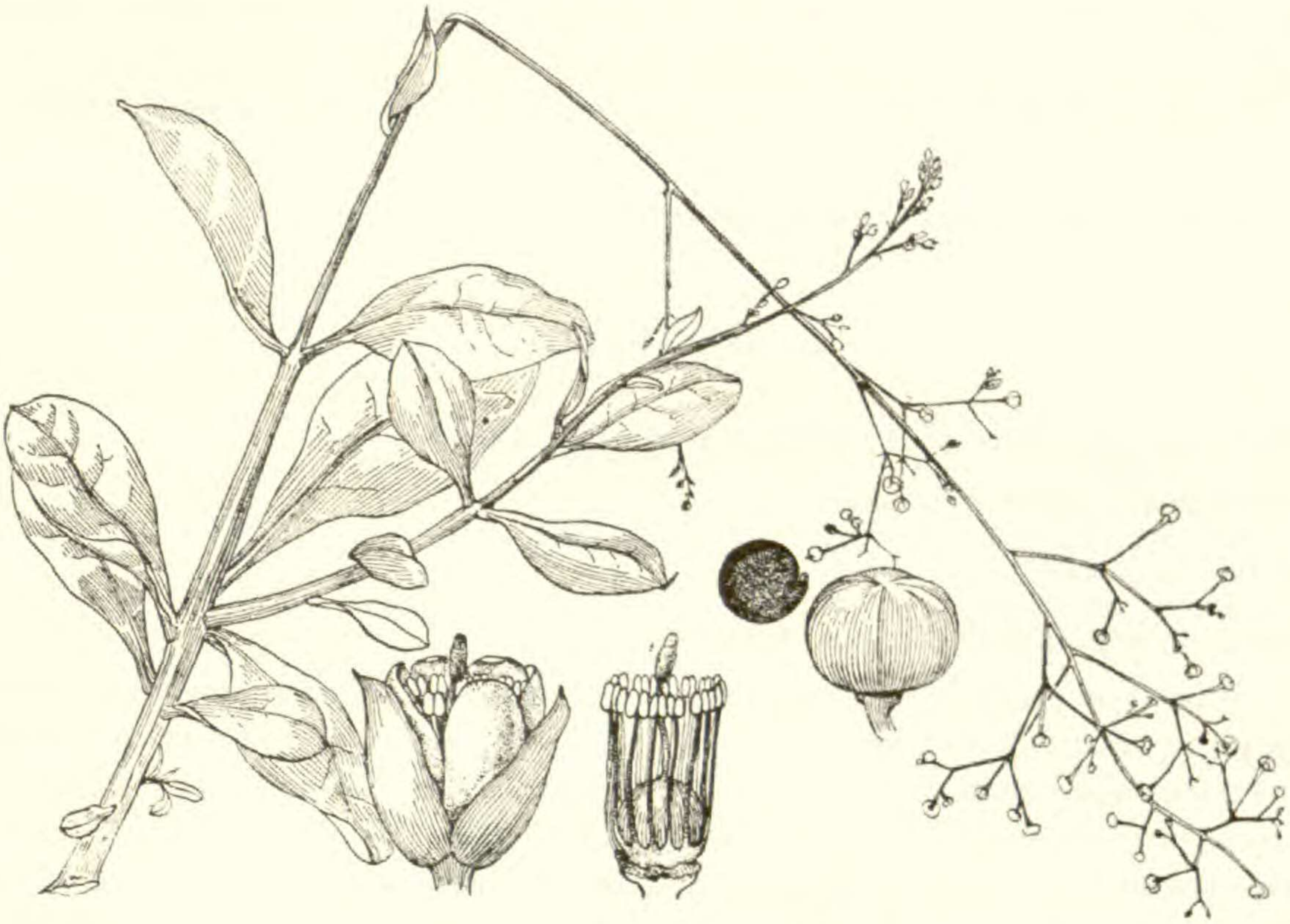

Fig. 135. *Talinum paniculatum*

Talinum moritziana Klotzsch, ex Rohrb. in Mart. Fl. Bras. 14^2:295. 1872.
Talinum roseum Klotzsch, ex Rohrb. loc. cit. 1872.
Talinum patens var. *sarmentosum* (Englm.) Gray, in Proc. Amer. Acad. 22:275. 1887.
Claytonia patens (L.) O. Ktze. Rev. Gen. 1:56. 1891.
Claytonia paniculata (Jacq.) O. Ktze. loc. cit. 57. 1891.
Claytonia reflexa (Cav.) O. Ktze. loc. cit. 1891.
Claytonia sarmentosa (Englm.) O. Ktze. loc. cit. 1891.
Talinum reflexum f. *sarmentosum* (Englm.) Small, Fl. SE. U. S. 415. 1903.
Talinum chrysanthum Rose & Standl. in Contr. U. S. Nat. Herb. 13:288. 1911.
Talinum paniculatum var. *sarmentosum* (Englm.) v. Poellnitz, in Deut. Bot. Gessel. Berichte 51:123. 1933.

Herbaceous plants, erect, slender, glabrous throughout, the root often thick and fleshy. Leaves alternate, broadly elliptic to obovoid, rarely oblanceolate, 4–13 cm. long, 1.5–5.5 cm. broad, acute to obtuse at the apex, cuneate or attenuate at the base, plane, petiole 3–15 mm. long. Inflorescence terminal, compound, lax, 10–60 cm. long, 6–20 cm. broad, the lateral simple or compound cymes racemosely arranged on the primary rhachis, bracteate; pedicel 6–25 mm. long, dilated distally. Sepals ovate, 1.5–3.0 mm. long and broad, connate at the base, slightly keeled, reflexing and deciduous; petals elliptic, 3.0–4.5 mm. long, about 1 mm. broad; stamens 15 or more, the filaments 1.5–2.0 mm. long, free, the anthers ovoid, to 0.5 mm. long and broad; ovary sessile, globose, about 1 mm. long, 1 mm. in diameter. Capsule ovoid to globose, 3–5 mm. long, 3–5 mm. in diameter; seeds strongly reniform, 0.75–1.0 mm. in diameter, the testa minutely striate, black, indistinctly strophiolate.

Southern United States, Central and South America, West Indies, southern Asia and the East Indies.

PANAMÁ: Isla Taboga, *Woodson, Allen & Seibert 1491.*

2. PORTULACA L.

Portulaca L. [Syst. ed. 1. 1735]; Sp. Pl. 445. 1753.

Meridiana L. f. Suppl. 248. 1781.
Lemia Vand. Fl. Lus. & Bras. Sp. 35, *t. 2. f. 15.* 1788.
Merida Neck. Elem. 2:382. 1790.
Portulacca Haw. Synop. 121. 1812.
Lamia Vandelli ex Endl. Gen. 949. 1840.

Annual or perennial herbs, succulent. Leaves alternate or approximate, terete to plane, often whorled about the flowers; stipules scarious, fimbriate or tufted, sometimes very small, rarely absent. Inflorescence near the stem apex, crowded, the flowers sometimes solitary, yellow to red. Sepals 2, opposite, connate below, the anterior larger than the posterior, usually persistent. Petals 4–6, connate at the base or free, somewhat auto-deliquescent. Stamens 4 to many, inserted at the base of the petals, the filaments often hairy below. Ovary half to wholly inferior, the ovules numerous, the styles 3- to 9-parted, rarely simple. Capsule circumscissile, chartaceous; seeds reniform to cochleate, numerous, the testa smooth or minutely tuberculate.

A cosmopolitan genus in tropical and subtropical areas of the world, about 125 species.

1. **Portulaca oleracea** L. Sp. Pl. 445. 1753.

Portulaca parvifolia Haw. Syn. Pl. Succ. 122. 1812.
Portulaca marginata HBK. Nov. Gen. & Sp. 6:58. 1823.
Portulaca oleracea β parviflora (Haw.) Griseb. Fl. Brit. W. Ind. 57. 1864.
Portulaca oleracea α macrantha Eggers, Fl. St. Croix 27. 1879.
Portulaca oleracea β micrantha Eggers, loc. cit. 1879.

Plants herbaceous, radially spreading and prostrate or somewhat ascending, glabrous throughout, the roots fibrous. Leaves alternate, elliptic to obovoid, 1–3 cm. long, 0.5–1.0 cm. broad, generally obtuse at the apex, cuneate at the base, plane; petiole 1–8 mm. long, the stipules fimbriate, inconspicuous. Inflorescence with the flowers crowded, the flowers sessile or essentially so, yellow. Perianth tube crateriform, 1 mm. long, 1.5 mm. in diameter; sepals ovate, 3.0–4.5 mm. long, 3–4 mm. broad, strongly keeled, connate at the base, generally persistent and enclosing the operculum of the fruit; petals 4, 3.0–4.5 mm. long, 1.5–3.0 mm. broad; stamens 6–15, the filaments 1.5–1.75 mm. long, the anthers globose, to 0.5 mm. long and broad; ovary half-inferior, short-conical, the style lobes 4–6. Capsule ovoid to fusiform, 6–9 mm. long, about 2.5 mm. in diameter, circumscissile slightly below the middle; seeds almost cochleate, about 0.5–0.75 mm. in diameter, the testa minutely tuberculate, almost black.

Known as *verdolaga* in Panama. According to Standley (Field Mus. Nat. Hist. Bot. 18:429. 1937) the plant is used as a pot herb throughout Central America.

BOCAS DEL TORO: vicinity of Nievecita, *Woodson, Allen & Seibert 1862*. CHIRIQUÍ: Boquete, *Davidson 705*. DARIÉN: vicinity of Boca de Cupe, *Allen 875*; Río Chucunaque, *Leopold 758*. PANAMÁ: San José Island, *Johnston 901*.

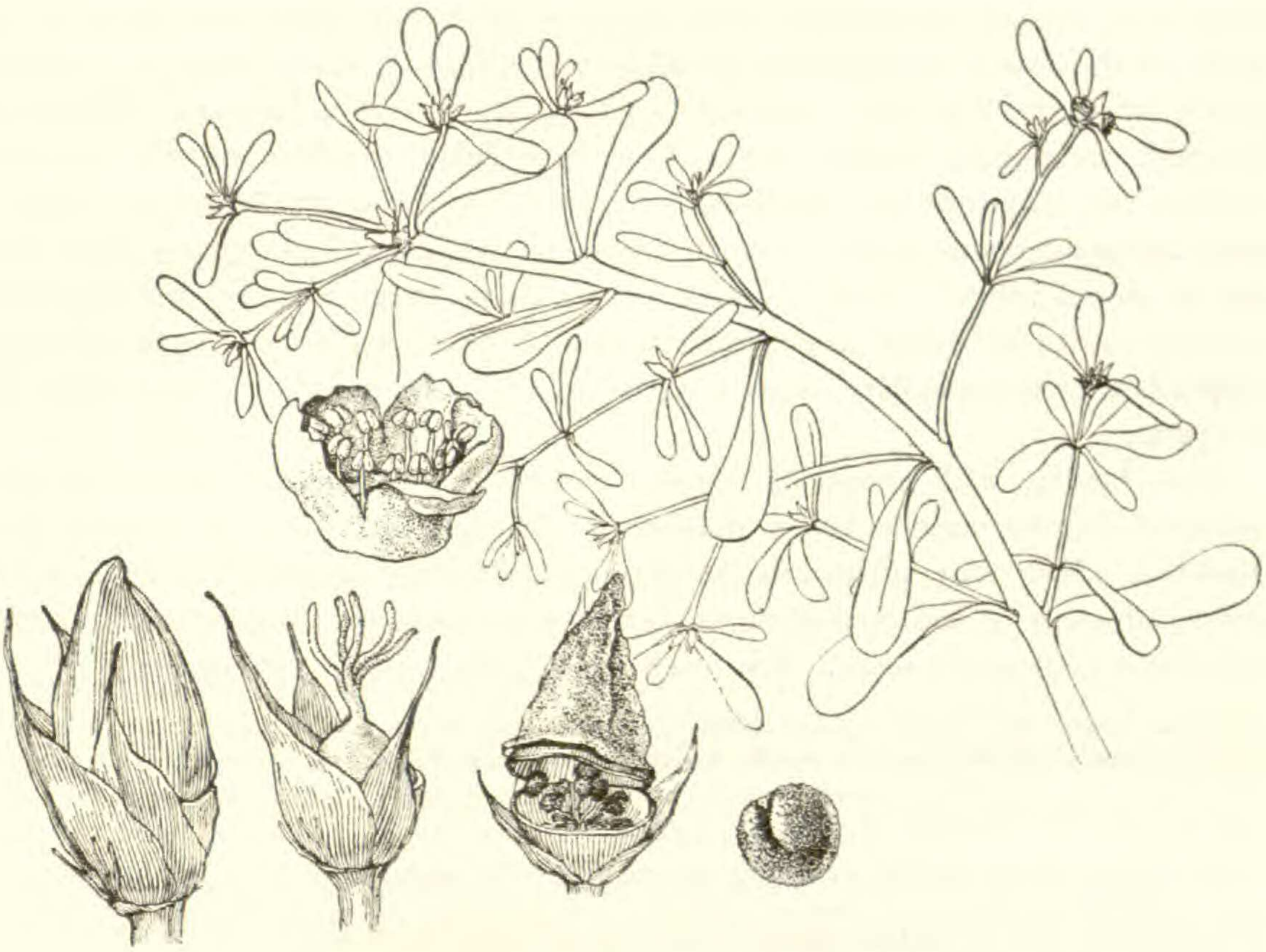

Fig. 136. *Portulaca oleracea*

CARYOPHYLLACEAE

By JAMES A. DUKE

Annual or perennial herbs or subshrubs, often with swollen nodes. Leaves opposite and decussate or verticillate, the petioles often amplexicaul, some with conspicuous stipules. Flowers commonly bisexual, actinomorphic, 5- or 4-merous, in dichasial cymes, or solitary in the axils, or solitary and terminal (*Githago*). Sepals 5–4, separate or connate, often scarious, persistent. Petals as many as the sepals, rarely absent, hypogynous or slightly perigynous, entire, bifid or lacerate, usually white, pink or red. Stamens 2–10, mostly 5 or 10; filaments filiform or flattened, occasionally united into a short tube below; anthers usually versatile, 2-celled, and longitudinally dehiscent. Carpels 2–5, the ovary 1-locular, with 1–many campylotropous ovules on basal, central or free central placentae, styles 2–5, free or united below. Fruit a utricle or a capsule longitudinally dehiscing into as many entire or deeply emarginate valves as there are styles; seeds 1–many, strophiolate or estrophiolate, smooth or tuberculate, the embryo curved about the perisperm.

This family, with about 75 genera, mostly in temperate areas, is of little economic interest except for a number of ornamentals, such as *Lychnis* and *Dianthus*, which may ultimately be found in Panama gardens. Several weedy genera, of more or less cosmopolitan distribution, despairingly need monographic research, worldwide in scope. Five such weedy genera occur in Panama.

a. Leaves longer than broad; stipules absent; stamens usually 10, rarely 4 or 5; capsule splitting into 2–5 usually 2-cleft valves; styles not united.

b. Leaves linear to elliptic; petals entire or shallowly emarginate............ 1. ARENARIA

bb. Leaves ovate to cordate; petals deeply bifid.

c. Leaves ovate; capsules cylindric, arcuate, with 10 teeth; styles usually 5............ 2. CERASTIUM

cc. Leaves ovate or cordate; capsules ovoid, straight, with 6–8 (–10) teeth; styles usually 2–4............ 3. STELLARIA

aa. Leaves shorter or longer than broad; stipules present, occasionally fugaceous; stamens 2–5; capsules splitting into 3 entire valves; styles usually united at least half their length.

d. Leaves broader than long, opposite, the ochraceous stipules often fugaceous; seeds 1–50, tuberculate in lines (in Panama)............ 4. DRYMARIA

dd. Leaves longer than broad, verticillate, the argentate stipules persistent; seeds 2–6, merely corrugated............ 5. POLYCARPAEA

1. ARENARIA L.

ARENARIA L. [Rupp. ex L. Syst. ed. 1. 1735] Sp. Pl. 423. 1753.

Moehringia L. [Syst. ed. 2:22. 1740] Sp. Pl. 359. 1753.
Minuartia L. Sp. Pl. 89. 1753
Gypsophytum Adans. Fam. 2:256. 1763.
Ammodenia Patrin, ex Gmel. Fl. Sibir. 4:160. 1769.
Alsine Scop. Fl. Carn. ed. 1:496. 1772. not L. 1753.
Honkenya Ehrh. Beitr. 2:180. 1788.
Leptophyllum Ehrh. loc. cit. 4:147. 1789.

Spergulastrum Michx. Fl. Bor. Am. 1:275. 1803. in part.
Alsinella Swartz, Summa Veg. Scand. 17. 1814.
Gouffeia Robill. & Cast. in Lam. & DC. Fl. Fr. 5:609. 1815.
Halianthus Fries, Fl. Holland 75. 1817.
Adenarium Raf. in Desv. Jour. Phys. 89:249. 1818.
Bigelovia Raf. in Jour. Phys. 89:289. 1819.
Siebera Hoppe, in Flora 2:24. 1819.
Somerauera Hoppe, loc. cit. 2:26. 1819.
Merckia Reichb. ex Cham. & Schlecht. in Linnaea 1:59. 1826.
Brachystemma D. Don, Prodr. Fl. Nep. 216. 1828.
Wilhelmsia Reichb. Consp. 206. 1828.
Odontostemma Benth. in Wall. Cat. *n. 645*. 1828.
Sabulina Reichb. Fl. Germ. Excurs. 785. 1832.
Eremogone Fenzl, Verbr. Alsin. 13:18. 1833.
Chetrophis Raf. Fl. Tell. 3:80. 1836.
Dolophragma Fenzl, in Ann. Wien. Mus. 1:63. *t. 7*. 1836.
Merkia Reichb. Handb. 298. 1837.
Plinthine Reichb. loc. cit. 298. 1837.
Alsinanthus Reichb. loc. cit. 298. 1837.
Dufourea Gren. in Act. Soc. Linn. Bord. 9:25. 1837.
Lepyrodiclis Fenzl, in Endl. Gen. 966. 1840.
Alsinanthe Reichb. Ic. Fl. Germ. 5:29. 1841.
Facchinia Reichb. loc. cit. 5:29. 1841.
Neumayera Reichb. loc. cit. 5:30. 1841.
Pettera Reichb. Nom. 205. 1841.
Tryphane Reichb. loc. cit. 205. 1841.
Wierzbickia Reichb. loc. cit. 205. 1841.
Greniera J. Gay, in Ann. Sci. Nat. 3^4:27. 1845.
Rhodalsine J. Gay, loc. cit. 3^4:25. 1845.
Strophium Dulac. Fl. Hautes-Pyr. 247. 1867.
Xeralsine Fourr. in Ann. Soc. Linn. n. s. 16:347. 1868.
Euthalia Rupr. Fl. Caucas. 220. 1869.
Brewerina A. Gray, in Proc. Am. Acad. 8:620. 1869.
Alsinopsis Small, Fl. S. E. U. S. 419 & 1330. 1903.

Annual, biennial or perennial herbs, glabrous or pubescent, prostrate and cespitose to diffuse and spreading, the stems somewhat resilient and occasionally suffruticose below. Leaves opposite, petiolate to sessile and slightly amplexicaul, exstipulate, subulate and coriaceous to broadly elliptic and membranaceous. Flowers axillary or terminal, solitary or in dichasial cymes. Sepals 5, connate only at the base if at all. Petals 5, rarely lacking, white or occasionally red, entire or shallowly emarginate. Stamens 10, rarely 5; anthers versatile; 2-celled, longitudinally dehiscent; filaments flattened and usually united below to form a slightly perigynous disk. Ovary superior, 3- (2–5-) carpellate with 3 (2–5) filiform styles free to their bases; ovules numerous on basal placentae. Capsule dehiscing into as many entire to deeply emarginate valves as there are styles; seeds numerous, cochleate, smooth to tuberculate, estrophiolate, the embryo curved about the perisperm.

A weedy genus containing nearly 200 species, this nearly cosmopolitan genus is in the tropics largely restricted to high altitudes. Fernald (in Rhodora 21:1. 1919) presents adequate reasons for retaining *Arenaria sensu lato* instead of maintaining several poorly separated generic segregates. Three intergrading units, best treated as subspecies of one polymorphic species, *A. lanuginosa,* are found in Panama.

a. Leaves oblong, lanceolate or ovate, the larger less than 20 mm. long; sepals glabrous or pubescent in lines, 2–5 mm. long, the petals and capsules longer or shorter; plants cespitose or diffuse.

  b. Plants diffuse, loosely spreading; sepals pubescent, 2–4 mm. long, the petals 2–4.5 mm. long; pedicels much longer than the subtending leaves; leaf margins usually plane.. 1. ssp. LANUGINOSA

  bb. Plants cespitose, much branched near the base, some of the branches occasionally proliferating; sepals glabrous, 3–5 mm. long, the petals 4–6 mm. long; pedicels shorter or longer than the subtending leaves; leaf margins usually involute.. 2. ssp. SAXOSA

aa. Leaves lanceolate, the larger over 20 mm. long; sepals conspicuously pubescent on the costae, 4–6 mm. long, the petals and capsules longer; plants diffuse and spreading.. 3. ssp. GUATEMALENSIS

1. **ARENARIA LANUGINOSA** ssp. **LANUGINOSA** Maguire, in Am. Midl. Nat. 48:498. 1951.

Spergulastrum lanuginosum Michx. Fl. Am. Bor. 1:275. 1803.
Micropetalum lanuginosum (Michx.) Pers. Syn. Pl. 1:509. 1805.
Arenaria alsinoides Willd. ex Schlecht. in Mag. Gesells. Nat. Freund. Berl. 7:201. 11816.
Stellaria elongata Nutt. Gen. 1:289. 1818.
Arenaria diffusa Ell. Sketch. Bot. S. C. & Ga. 1:519. 1821.
Arenaria nemorosa HBK. Nov. Gen. & Sp. 6:35. 1823.
Arenaria nemorosa α quitensis DC. Prodr. 1:409. 1824.
Arenaria nemorosa β novogranatensis DC. loc. cit. 1:409. 1824.
Arenaria jussiaei Camb. ex St. Hilaire, Fl. Bras. Mer. 2:126. 1829.
Arenaria scabra Vahl, ex St. Hilaire, loc. cit. 2:126. 1829.
Arenaria paradoxa Bart. Rel. Haenk. 2:15. 1831.
Stellaria lanuginosa (Michx.) Torr. & Gray, Fl. Amer. Bor. 1:187. 1840.
Arenaria lanuginosa α genuina Rohrb. in Linnaea 37:260. 1872.
Arennaria lanuginosa β diffusa Rohrb. loc. cit. 37:263. 1872.
Arenaria lanuginosa diffusa (Ell.) Macloskie, Rep. Princeton Univ. Exped. Patag. 8:394. 1905.
Stellaria laxa Muschl. in Bot. Jahrb. 45:443. 1911.
Arenaria lanuginosa var. *longipedunculata* Duncan, in Phytologia 3:282. 1950.

Herbaceous puberulent laxly spreading perennials. Leaves opposite, lanceolate, oblanceolate or narrowly elliptic, apically attenuate and mucronulate, basally subsessile and attenuate, 5–20 mm. long, 2–5 mm. broad, scantily to densely puberulent with a whitish indumentum, often ciliate on the margins. Flowers solitary in the axils, the puberulent pedicels much longer than the subtending leaves. Sepals lanceolate to ovate, attenuate, puberulent 2–4.5 mm. long; petals 5, occasionally absent, obovate, entire, 2–4.5 mm. long; stamens 10, the filaments 1–4 mm. long; ovary sessile or short-stipitate, ovoid; styles 2–4. Capsule ovoid, 3–5 mm. long, the 2–4 valves deeply emarginate; seeds numerous, on basal placentae, cochleate, dark reddish brown to black, smooth or minutely tuberculate, ca. 0.75 mm. broad.

Southeastern U. S. to Peru and Bolivia, in Central America only at moderate elevations.

CHIRIQUÍ: vicinity of "New Switzerland", central valley of Río Chiriquí Viejo, 1800–2000 m., *Allen 1414*; vicinity of Boquete, 1200–1500 m., *Woodson & Schery 802*.

The typical species was originally described as apetalous, as are most specimens from the southeastern United States, the type locality. In Mexico and Central America however, where the ranges of several subspecies overlap, the large majority of specimens, obviously referable to this "apetalous" subspecies, have petals nearly or quite as long as the sepals.

MacBride (in Field Mus. Bot. 13^2:601. 1936–8) reports that in Peru, where the plant is called *celedonia* and *tauchchalli*, it is the source of an astringent used for hemorrhages of the uterus.

2. ARENARIA LANUGINOSA ssp. SAXOSA (A. Gray) Maguire, in Am. Midl. Nat. 48: 498. 1951.

Arenaria saxosa A. Gray, Pl. Wright. 11:18. 1853.
Arenaria saxosa var. *cinerascens* Robinson, in Proc. Am. Acad. 29:293. 1894.
Arenaria confusa Rydb. in Bull. Torr. Club 28:275. 1901.
Arenaria polycaulos Rydb. loc. cit. 31:406. 1904.
Arenaria mearnsii Woot. & Standl. in Contr. U. S. Nat. Herb. 16:121. 1939.
Arenaria saxosa var. *mearnsii* (Woot. & Standl.) Kearney, & Peebles, in Jour. Wash. Acad. 29:475. 1939.

Herbaceous (occasionally subligneous at the base) puberulent cespitose perennials, some of the branches occasionally proliferating and spreading. Leaves opposite, mostly linear-lanceolate, apically attenuate and mucronulate, basally subsessile and rounded to acute, 5–18 mm. long, 1–3 mm. broad, scantily to densely puberulent with a whitish indumentum, often ciliate on the involute margins. Flowers solitary in the axils, the puberulent pedicels longer or occasionally shorter than the subtending leaves. Sepals lanceolate to ovate, attenuate, glabrous, 3–5 mm. long; petals 5, obovate, entire, 4–6 mm. long; stamens 10, the filaments 1–4 mm. long; ovary sessile or short-stipitate, ovoid; styles 2–4. Capsule ovoid, 3–5 mm. long, the 2–4 valves deeply emarginate; seeds numerous, on basal placentae, cochleate, dark reddish brown, usually tuberculate, ca. 0.75 mm. broad.

Southwestern U. S. to Mexico; Panama to northwestern South America, at rather high elevations.

CHIRIQUÍ: Potrero Muleto, Volcán Chiriquí, Boquete District, 10,400 ft., *Davidson 1041 & 1051*; Potrero Muleto to summit, Volcán Chiriquí, 3500–4000 m., *Woodson & Schery 405 & 434*; Loma Larga to summit, Volcán Chiriquí, 2500–3380 m., *Woodson, Allen & Seibert 1073*.

3. ARENARIA LANUGINOSA ssp. **guatemalensis** (Standl. & Steyerm.) J. Duke comb. & stat. nov.

Arenaria guatemalensis Standl. & Steyerm. in Field Mus. Bot. 23:50. 1944.

Herbaceous puberulent laxly spreading perennials. Leaves opposite, lanceolate, apically attenuate and mucronulate, basally subsessile and attenuate, 10–40 mm. long, 2–6 mm. broad, irregularly puberulent with a whitish indumentum, often ciliate on the margins. Flowers solitary in the axils, the puberulent ebracteate pedicels 10–40 mm. long, usually exceeding the subtending leaves. Sepals lanceolate to ovate, attenuate, strongly puberulent on the costa, 4–6 mm. long; petals 5, obovate, entire, 5–8 mm. long; stamens 10, the filaments 3–6 mm. long; ovary sessile or short-stipitate, globose or ovoid; styles 2–4. Capsule ovoid, 5–8 mm. long, the 3 valves deeply emarginate; seeds numerous, on basal placentae, cochleate,

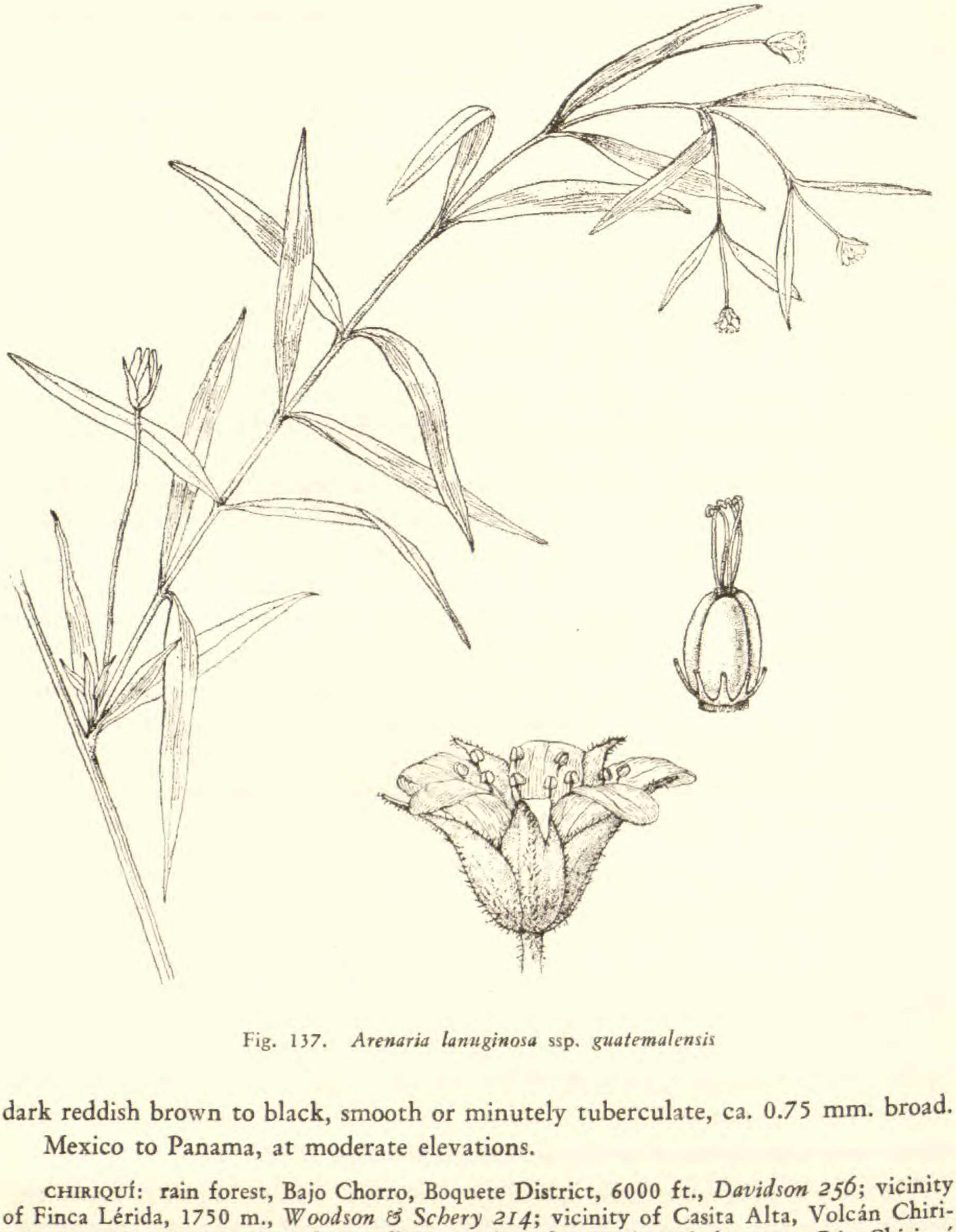

Fig. 137. *Arenaria lanuginosa* ssp. *guatemalensis*

dark reddish brown to black, smooth or minutely tuberculate, ca. 0.75 mm. broad.

Mexico to Panama, at moderate elevations.

CHIRIQUÍ: rain forest, Bajo Chorro, Boquete District, 6000 ft., *Davidson 256*; vicinity of Finca Lérida, 1750 m., *Woodson & Schery 214*; vicinity of Casita Alta, Volcán Chiriquí, ca. 1500–2000 m., *Woodson, Allen & Seibert 819*; valley of the upper Río Chiriquí Viejo, vicinity of Monte Lirio, 1300–1900 m., *Seibert 297*; in grassy sunny places, vicinity of Cerro Punta, 1500–2000 m., *Seibert 260*.

Other variants of the *lanuginosa* complex are found in Mexico and Central America and could conceivably occur in Panama. In the subspecies *guatemalensis*, the variety *ensifolia*, with linear leaves and exerted petals, is so far reported only from southern Mexico. Characterized by ovate leaves, cuneate to cordate leaf bases and exerted petals, the variant currently passing as *A. megalantha* (Rohrb.)

F. N. Williams would probably better be treated as a *lanuginosa* subspecies, ranging from southern Mexico to Guatemala. The original description of *A. guatemalensis* would have been more edifying had it been contrasted with *A. lanuginosa* instead of *A. megalantha,* for although intergrades occur between all three, they are more frequent and perplexing between the first two. The relative constancy of these three taxa, where their ranges are distinct, coupled with limited intergradations near the commissures of their ranges, seems to justify their relegation to the subspecific level, in accord with the heirarchy established by Maguire (in Am. Midl. Nat. 46:493. 1951) in his monograph of the North American species of *Arenaria.*

2. CERASTIUM L.

CERASTIUM L. Sp. Pl. 437. 1753.

Prevotia Adans. Fam. 2:256. 1763.
Centunculus Adans. loc. cit. 2:256. 1763.
Moenchia Ehrh. Beitr. 2:177. 1788.
Quaternella Ehrh. loc. cit. 4:149. 1789.
Doerriena Borkh. in Rhein Mag. 1:528. 1793.
Myosotis Tourn. ex Moench, Meth. 224. 1794.
Esmarchia Reichb. Fl. Germ. Excurs. 793. 1832.
Doerriera Steud. Nom. 2^1:522. 1840.
Prevoita Steud. loc. cit. 394. 1840.
Pentaple Reichb. Ic. Fl. Germ. 5:37. *t. 227.* 1841.
Dichodon Bartl. ex Reichb. Nom. 205. 1841.
Leucodonium Opiz, Seznam 59. 1852.

Annual or perennial, usually pubescent, erect or decumbent herbs. Leaves opposite, usually sessile or subsessile, exstipulate, often viscid. Flowers few in dichasial cymes, white. Sepals 5, rarely 4, not connate. Petals as many as the sepals, rarely absent, emarginate or 2-cleft, white. Stamens 10, occasionally less; anthers versatile, 2-celled, longitudinally dehiscent; filaments flattened, scarcely if at all connate to form an obscurely glandular annulus. Ovary superior; carpels 5, rarely fewer, with as many distinct styles, the many campylotropous ovules arising from basal or central placentae. Capsule often arcuate (hence the generic name), dehiscing longitudinally into as many deeply emarginate valves as there are styles; seeds numerous, cochleate, usually tuberculate, estrophiolate, the embryo coiled about the perisperm.

Of this weedy cosmopolitan, temperate genus, only one of about fifty species occurs in Panama.

1. CERASTIUM VISCOSUM L. Sp. Pl. 437. 1753.

Cerastium glomeratum Thuill. Fl. Paris 225. 1799.
Cerastium consanguineum Wedd. in Ann. Sci. Nat. 5^1:296. 1864.
Cerastium viscosum β consanguineum (Wedd.) Rohrb. in Linnaea 37:284. 1872.

Herbaceous viscid-villous freely branching annuals, prostrate, spreading or erect. Leaves opposite, viscid-villous, elliptic to ovate or obovate, apically rounded

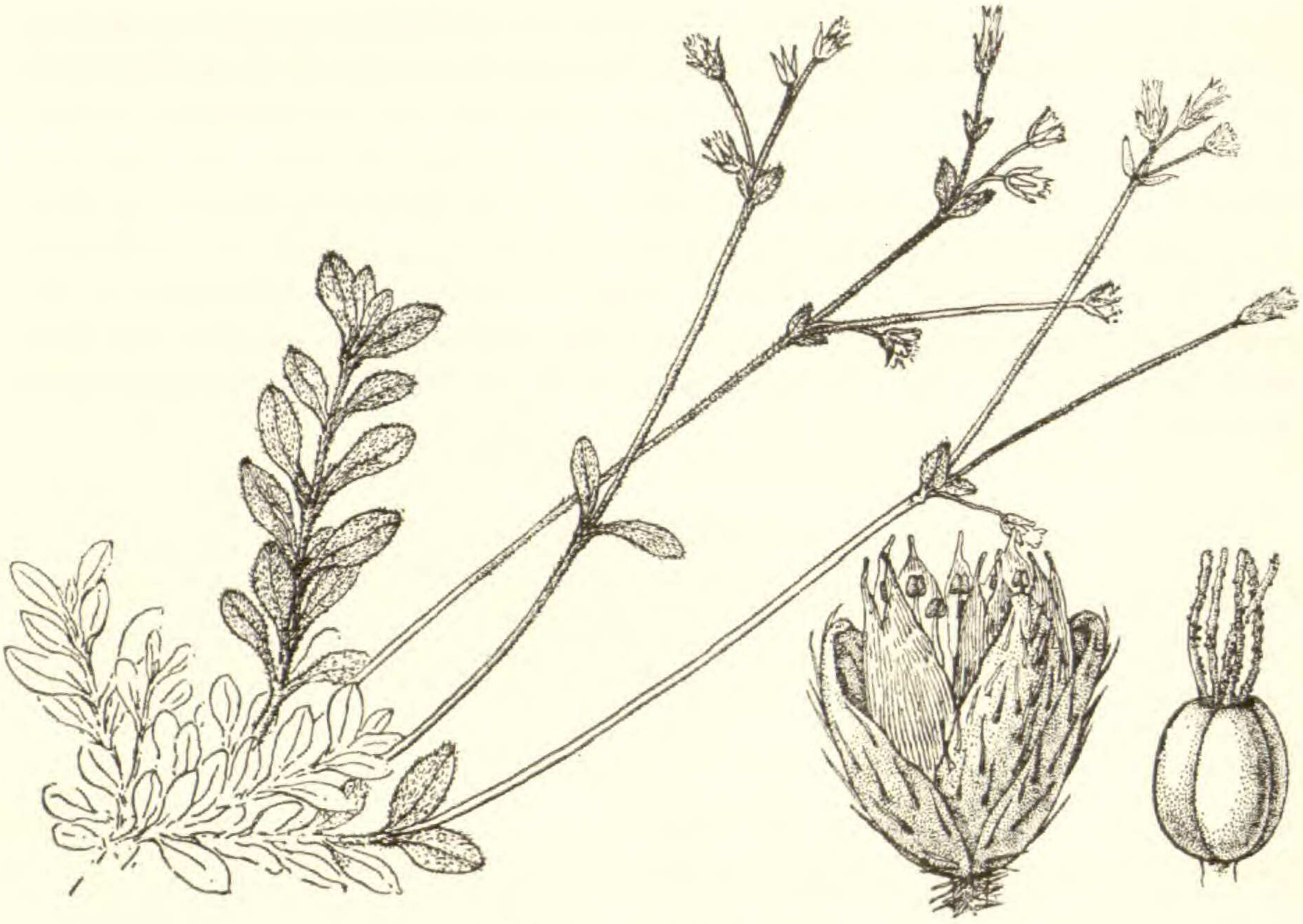

Fig. 138. *Cerastium viscosum*

and usually mucronulate, basally attenuate, 5–25 mm. long, 3–15 mm. broad, the winged petioles less than 5 mm. long. Flowers few in terminal dichasial cymes with reduced foliaceous bracts at the major dichotomies, the lanate to villous pedicels becoming 5–10 mm. long, exceeding the subtending bracts. Sepals 5, ovate to lance-oblong, acute to attenuate, villous, 3–5 mm. long; petals 5, rarely none, oblong, deeply 2-cleft, 3–5.5 mm. long; stamens 10, the flattened filaments 2–4 mm. long; ovary sessile or short-stipitate, ovoid; styles usually 5, 1.5–2 mm. long, glandular throughout; ovules many, campylotropous on central placentae. Capsule subcylindric, arcuate, 6–8 mm. long, the 5 valves deeply 2-cleft; seeds numerous, cochleate, light brown, minutely tuberculate, ca. 1 mm. broad.

Naturalized from Europe, now rather common throughout temperate and tropical America.

CHIRIQUÍ: Potrero Muleto to summit, Volcán Chiriquí, 3500–4000 m., *Woodson & Schery 472*; vicinity of Boquete, 1200–1500 m., *Woodson & Schery 804*.

3. STELLARIA L.

STELLARIA L. Sp. Pl. 421. 1753.

Myosoton Moench. Meth. 225. 1794.
Spergulastrum Michx. Fl. Am. Bor. 1:275. 1803. In part.

Micropetalon Pers. Syn. 1:509. 1805.
Alsinella Swartz, Summa Veg. Scand. 17. 1814. In part.
Larbrea St. Hilaire, in Mém. Mus. Par. 2:287. 1815.
Malachium Fries, Fl. Halland. 77. 1817.
Ballarion Raf. in Am. Month. Mag. 266. 1818.
Leucostemma Benth. in Wall. Cat. *n. 642*. 1828.
Kraschenínikovia Turcz. ex Bess. in Flora 17^1 Beibl.: 9. 1834.
Adenonema Bunge, in Mem. Sav. Etr. Petersb. 2:448. 1836.
Schizotechium Reichb. Nom. 205. 1841.
Hylebia Fourr. in Ann. Soc. Linn. Lyon n. s. 16:347. 1868.
Myosanthus Fourr. loc. cit. n. s. 16:348. 1868.

Annual or perennial herbs, often much branched and clambering, the stems somewhat resilient and occasionally suffruticose below. Leaves opposite, petiolate or sessile and somewhat perfoliate, exstipulate, in Central America rather broad and membranaceous. Flowers in few-flowered dichasial cymes or less frequently solitary in the axils of slightly reduced leaves. Sepals 4–5, not connate. Petals 4–5, rarely absent, white, deeply 2-cleft. Stamens 4–10; anthers versatile, 2-celled, the flattened hypogynous filaments connate below forming a brief glandular disk. Ovary superior, carpels 2–4, with as many filiform styles free to the base; ovules 4–many, campylotropous on basal, central or free central placentae. Capsule deeply or shallowly dehiscing into as many 2-cleft or rarely entire valves as there are styles; seeds 4–many, cochleate, smooth or tuberculate, estrophiolate, the embryo curved about the perisperm.

Composed of about a hundred species, this weedy genus is nearly cosmopolitan, but is, as are most caryophyllaceous genera, largely restricted to high altitudes in the tropics. Three of the six Central American species are found in Panama.

a. Flowers solitary in the axils or in few-flowered leafy cymes; sepals and petals 5; stamens 8–10; seeds numerous; pedicels not glandular-villous; leaves ovate or cordate.
  b. Leaves cordate; petals 8–10 mm. long, 1.5–2 times as long as the sepals; spines on the seeds usually broader than long.............................. 1. S. NEMORUM
  bb. Leaves ovate; petals 3–6 mm. long, 1–1.5 times as long as the sepals; spines on the seeds usually longer than broad.. 2. S. OVATA
aa. Flowers many in dichasial cymes with minute bracts; sepals and petals 4; stamens 4–6 (–8); seeds 4–6; pedicels glandular-villous, leaves cordate. 3. S. IRAZUENSIS

1. STELLARIA NEMORUM L. Sp. Pl. 421. 1753.

Cerastium nemorum Crantz, Inst. 2:401. 1766.
Stellaria nemoralis Salisb. Prodr. 301. 1796.
Stellaria cuspidata Willd. ex Schlecht. in Ges. Natur. Freund. Berlin Mag. 7:196. 1816.
Stellaria reichenbachii Wierzb. in Reichb. Ic. Fl. Germ. 5:34. 1841.
Stellaria baldwini Fenzl, in Linnaea 30:57. 1859-60.
Stellaria ciliata β cuspidata (Willd.) Rohrb. in Linnaea 37:278. 1872.
Stellaria nemorum var. *japonica* Franch. & Sav. Enum. Pl. Jap. 2^1:295. 1876.
Stellaria montana Pierrat, in Soc. Bot. Roche 2:58. 1880.
Stellaria nemorum subsp. *glochidosperma* Murb. in Act. Univ. Lunds. 27:156. 1892.
Stellaria nemorum subsp. *montana* (Pierrat) Murb. Bot. Notiser 201. 1899.
Stellaria nemorum subsp. *montana* forma *reichenbachii* (Wierzb.) Murb. loc. cit. 201. 1899.
Stellaria francheti Honda, in Bot. Mag. Tokyo 43:541. 1929.
Stellaria limitanea Standl. in Field Mus. Bot. 22:74. 1940.

Herbaceous glabrous to pubescent profusely branching perennials, prostrate, spreading or clambering. Leaves opposite, glabrous to viscid-villous, ovate, apically acute to attenuate, basally truncate to cordate, 10–50 mm. long, 5–35 mm. broad, all except the uppermost petiolate, the petioles 5–40 mm. long. Flowers solitary, axillary or terminal, or in terminal few-flowered cymes, the glabrous to villous pedicels 5–45 mm. long, often exceeding the subtending leaves. Sepals 5, lanceolate to ovate, acute to attenuate, glabrous to villous, 4–6 mm. long; petals 5, obovoid, deeply 2-cleft, 6–12 mm. long; stamens 10, the filaments flattened, 3–8 mm. long; ovary sessile, globose to ovoid; styles usually 3, 2–3 mm. long, the numerous ovules campylotropous on basal or free central placentae. Capsule ovoid, 4–7 mm. long, the 3 valves deeply 2-cleft; seeds numerous, ca. 1 mm. broad, cochleate, dark reddish brown, tuberculate, the spines usually broader than long.

In the New World, extending from Mexico to Patagonia.

BOCAS DEL TORO: Robalo trail, northern slopes of Cerro Horqueta, 6000–7000 ft., *Allen 4997*. CHIRIQUÍ: Potrero Muleto to summit, Volcán Chiriquí, 3500–4000 m., *Woodson & Schery 393*.

The New World material seems indistinguishable from the Old World material except that seeds tend to be more uniformly tuberculate and leaves do not tend to be so large in New World specimens. Phytogeographically it might seem that New World specimens might at least deserve subspecific rank, but I am unable to detect any constant differentia therein. The non-papillate tubercles on the seeds of Panama representatives more closely resemble those of the European subspecies *montana* (Pierrat) Murb. than those of the subspecies *glochidosperma* Murb.

2. STELLARIA OVATA Willd. ex Schlecht. in Ges. Naturf. Freund. Berl. Mag. 7:196. 1816.

Herbaceous mostly glabrous, branching perennials, prostrate or spreading. Leaves opposite, glabrous or subglabrous, ovate to broadly ovate, apically rounded and mucronulate, basally rounded but slightly attenuate, 10–40 mm. long, 5–30 mm. broad, the petioles 3–8 mm. long. Flowers solitary in the axils, the glabrous to villous pedicels 10–40 mm. long, usually exceeding the subtending leaves. Sepals 5, ovate to obovate, obtuse to acute, glabrous to villous, 2.5–5 mm. long; petals 5, obovate, deeply 2-cleft, 3–6 mm. long; stamens 10, the flattened filaments 3–4.5 mm. long; ovary sessile, ovoid; styles usually 3, 1–1.5 mm. long, the numerous ovules campylotropous on basal placentae. Capsule ovoid, 3–5 mm. long, the 3 valves deeply 2-cleft, occasionally entire; seeds numerous, ca. 1 mm. broad, cochleate, dark reddish brown, tuberculate, the mature spines usually longer than broad.

Mexico through Central America to northern and western South America.

CHIRIQUÍ: valley of the upper Río Chiriquí Viejo, 1300–1900 m., *White & White 3*; valley of the upper Río Chiriquí, vicinity of Monte Lirio, 1300–1900 m., *Seibert 275*; Palo Alto, just e. of Boquete, 5000 ft., *Stern, Chambers et al. 1007*.

Standley and Steyermark (in Field Mus. Bot. 24^4:238. 1946) report the following vernacular names are applied in Guatemala: *tripa de pollo, culantro de monte* and *cuartillera.*

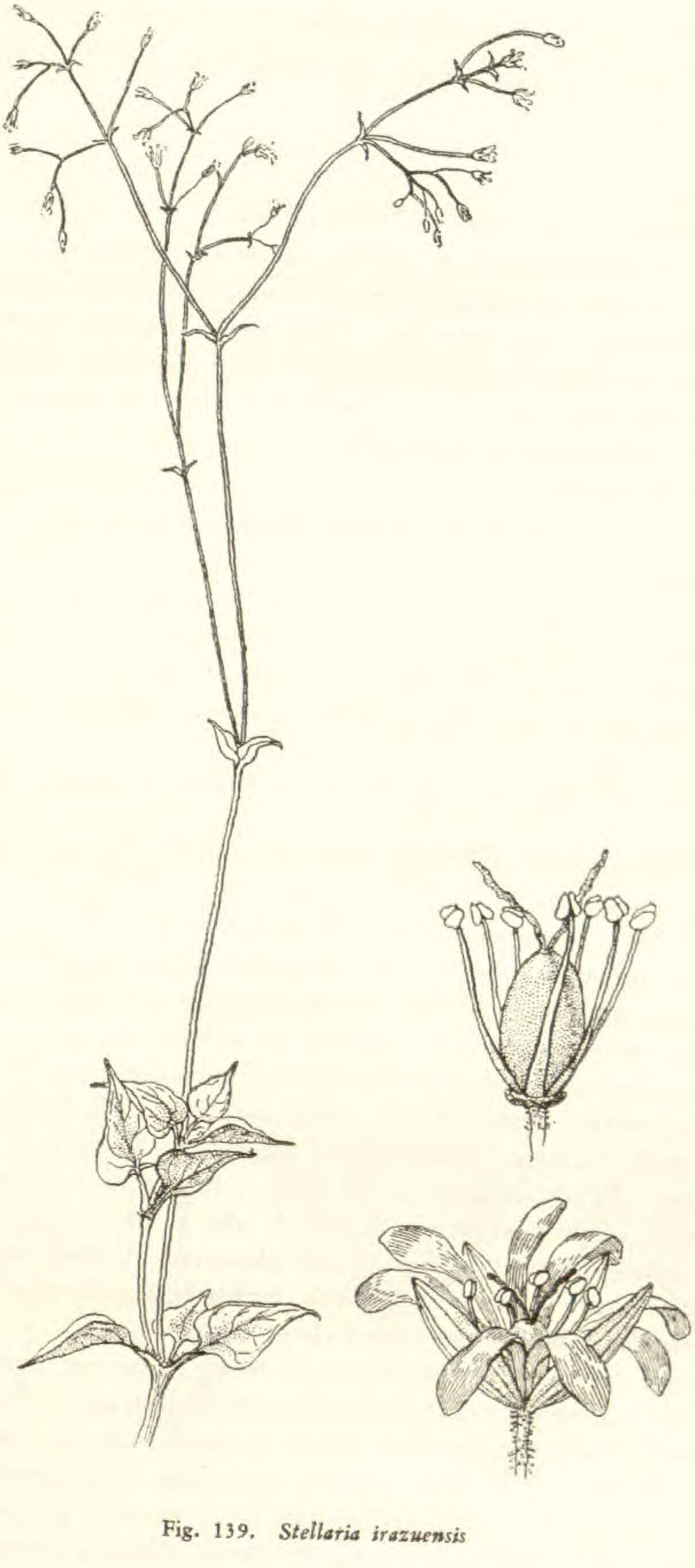

Fig. 139. *Stellaria irazuensis*

3. STELLARIA IRAZUENSIS Donn. Smith, in Bot. Gaz. 23:236. 1897.

Herbaceous, mostly glabrous, much branching perennials, prostrate or spreading. Leaves glabrous, ovate to deltoid, apically attenuate, basally cordate, 10–20 mm. long, 5–15 mm. broad, the scantily villous petioles 5–15 mm. long. Flowers several in dichotomously branching cymes 10–25 cm. long, with minute bracts at the major dichotomies, the glandular-villous pedicels 5–10 mm. long. Sepals 4, narrowly ovate to elliptic, obtuse to acute, glabrous or glabrate, 1.5–2.5 mm. long; petals 4, deeply 2-cleft, the segments linear, 1.5–3.0 mm. long; stamens 4–6 (–8), the flattened filaments 1.5–2.5 mm. long; ovary sessile, ellipsoid; styles usually 2, ca. 1 mm. long, the 4–6 ovules campylotropous on basal placentae. Capsule flattened, ellipsoid, ca. 2 mm. long, the 2 valves emarginate; seeds 6 or less, ca. 1 mm. broad, cochleate, dark reddish brown, tuberculate.

Guatemala to Panama.

CHIRIQUÍ: vicinity of Bajo Chorro, 1900 m., *Woodson & Schery 640.*

Further study of this distinctive tetramerous species may well prove it to be conspecific with S. *venezuelana* Steyerm., which Steyermark rightly separated from the heterogeneous assemblage described as *S. micrantha* Spruce ex Rohrb. Rohrbach's description is not at all applicable to *Fendler 47* which was designated as cotype of S. *micrantha*, and which is quite apparently referable to S. *venezuelana.*

4. DRYMARIA Willd. ex Roem. & Schult.

DRYMARIA Willd. ex Roem. & Schult. Syst. 5:31. 1819.

Pinosia Urban, in Arkiv Bot. $23A^5$:70. *pl.* 2. 1930.
Mollugophytum M. E. Jones, in Extr. Contr. West. Bot. 18:35. 1933.

Annual or perennial, glabrous to pubescent herbs, occasionally subligneous below, prostrate, spreading or erect. Leaves opposite, with persistent or fugaceous small stipules, sessile or petiolate, glabrous to villose, the hairs often glandular. Flowers in few-flowered racemes or in dichasial cymes, rarely solitary in the axils. Sepals 5, not connate. Petals (0–) 5, white, usually 2-cleft, with the sinus of the cleft occasionally laciniate. Stamens 2–5, the anthers versatile, 2-celled, the flattened filaments slightly connate at the base, rarely with prominent staminodia. Ovary superior, slightly stipitate; carpels 3, the 3 styles united below; ovules few–many, campylotropous on free central placentae. Capsule ovoid to spheroid, dehiscing into 3 entire valves; seeds 1–many, cochleate, foetiform or hippocrepiform, usually tuberculate, the embryo curved about the perisperm.

Exceptional for the Caryophyllaceae in being an almost exclusively tropical genus, *Drymaria* is represented in Panama by only two species. *D. glandulosa* Presl. and *D. palustris*, both ranging from North to South America, have not yet been collected in Panama. The genus consists of perhaps sixty species, all but three confined to tropical and subtropical America. A peculiar group of species with foetiform seeds centers about *D. holosteoides* Benth. which is a seriously toxic range plant of the Sonoran Desert (Little, in Ecology 18:416. 1937). In the only existing revisionary treatment of the genus, Wiggins (in Proc. Calif. Acad. Sci. 4^{25}:189. 1944), dealing with species on and near the Sonoran Desert, recognizes that the seeds are distinctive but lays little emphasis thereon. In my soon forthcoming revision of the whole genus, the seeds are one of the most important diagnostic characters, and the petal and leaf shapes are next respectively in importance to an understanding of the relationships that exist in the genus.

a. Leaves and pedicels scantily to densely villose with long, spreading non-glandular hairs; lobes of the petals acute to emarginate, 2–4-nerved, basally provided with linear auricles; seeds 0.5–0.9 mm. broad, with stellate tubercles.. 1. D. VILLOSA

aa. Leaves glabrous or puberulent; pedicels locally girdled with dense bands of glandular pubescence; lobes of the petals acute, 1-nerved, basally exauriculate; seeds 1.0–1.5 mm. broad, with domical tubercles............... 2. D. CORDATA

1. **DRYMARIA VILLOSA** Cham. & Schlecht. in Linnaea 5:232. 1830.

Drymaria hirsuta Bartl. in Presl, Rel. Haenk. 2:8. 1831.
Drymaria cubensis Regel, in Otto & Dietr. Allg. Garten. 8:298. 1840.

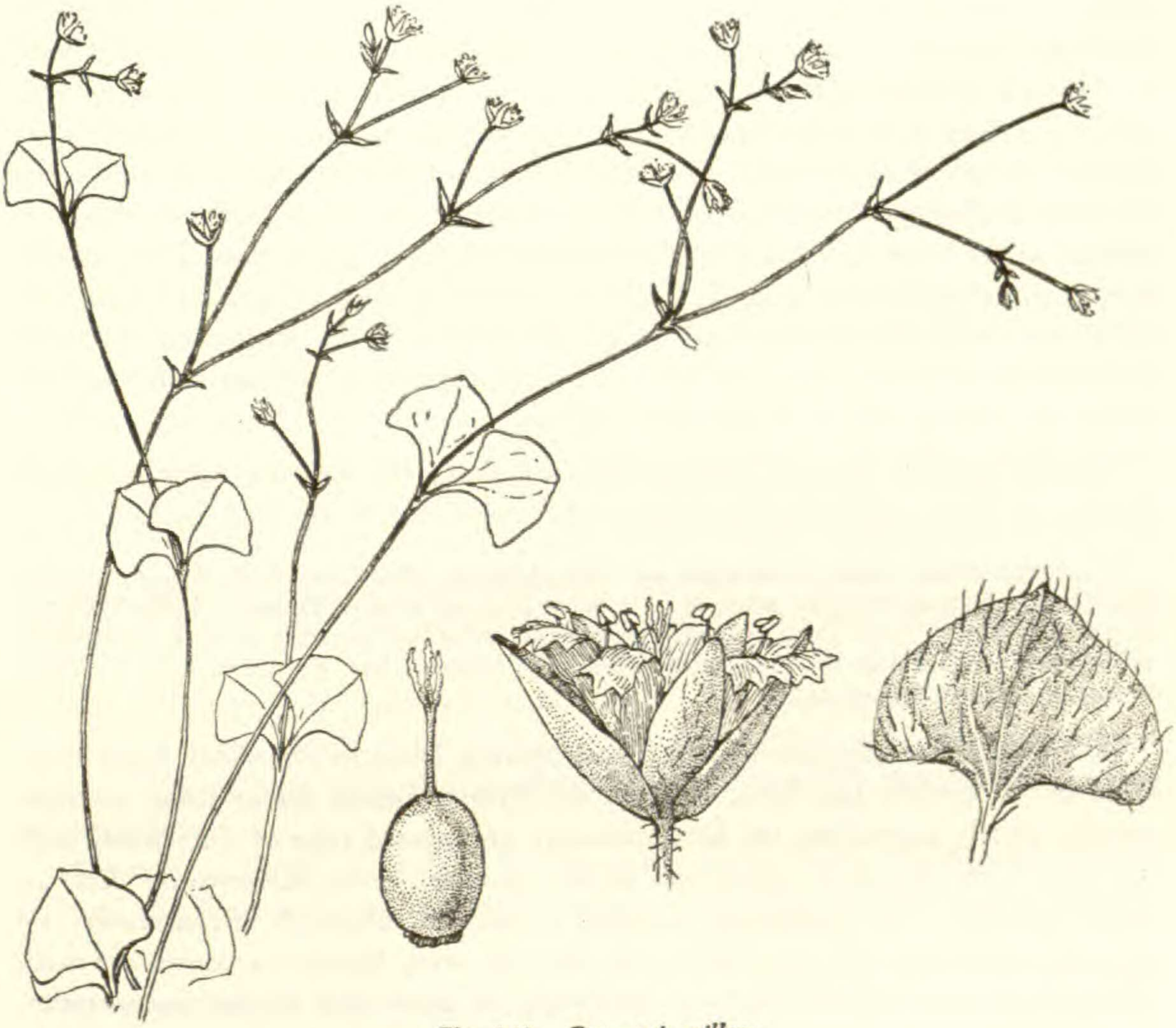

Fig. 140. *Drymaria villosa*

Drymaria cordata var. *pilosa* Schlecht. in Linnaea 26:374. 1853.
Drymaria cordata var. δ *villosa* (Cham. & Schlecht.) Rohrb. in Mart. Fl. Bras. 14^2:260. 1872.
Drymaria stylosa Backer, in Bull. Jard. Bot. Buitenz. 2^{12}:15. 1913.
Drymaria tepicana M. E. Jones, in Contr. West. Bot. 15:124. 1929.
Drymaria barrancae M. E. Jones, loc. cit. 18:65. 1931.

Prostrate or ascending herbaceous annuals to as much as 45 cm. long, the internodes mostly longer than the leaves, villose to hirsute with septate hairs to as much as 2 mm. long. Leaves opposite, scantily to densely villose or hirsute with cinereous or ochraceous hairs, orbicular to reniform, apically rounded to acute and apiculate, basally cordate to truncate, weakly 3–7-veined, 5–15 mm. long, 5–15 mm. broad; petioles 1–10 mm. long, the stipules mostly entire, scarcely distinguishable from the villosity, 0.5–1.5 mm. long. Inflorescences of terminal 5–many-flowered cymes, the ultimate branches often tending to be racemose; peduncles 1–5 cm. long; bracts 0.5–1.5 mm. long, the pedicels 2–20 mm. long, villose. Sepals 5, 2–3.6 mm. long, 1–2 mm. broad, narrowly to broadly ovate or elliptic, apically acute to obtuse, villose to glabrous, weakly 3-nerved, with translucent borders; petals 5 (absent or drastically reduced in forms passing as *D. tepicana*), 2–3.6 mm. long, bifid for half their length or more, the lobes apically acute to deeply emarginate, 2–4-nerved, basally provided with linear auricles, these very variable in number and orientation; stamens usually 5, 2–3.5 mm. long, the oblong anthers 0.3–0.5 mm. long, the filaments shallowly connate, devoid of staminodia; ovary at anthesis ovoid to globose; styles 3, united for half their length or more, 1–1.5 mm. long; ovules numerous, campylotropous on free central placentae. Capsule ovoid to ellipsoid, 2–3.5 mm. long, many-seeded (rarely as few as two in *D. tepicana*), the seeds cochleate, 0.5–0.9 mm. broad, the dorsal tubercles filiform to capitate or subpinnate, longer than broad, the facial tubercles stellate.

Central Mexico through Central America along the western coast of South America to Peru; apparently introduced and widespread in the East Indies.

CHIRIQUÍ: Finca Lérida to Boquete, ca. 1300–1700 m., *Woodson, Allen & Seibert 1162*; Bajo Chorro, Boquete District, 6000 ft., *Davidson 294*; vicinity of Boquete, 1200–1500 m., *Woodson & Schery 710*. COCLÉ: lower portion of valley and marshes along R. Antón, El Valle de Antón, ca. 500 m., *Hunter & Allen 379*; between Las Margaritas and El Valle, *Woodson, Allen & Seibert 1771*.

Examination of adequate material from Mexico, home of *D. villosa*, from Peru, home of *D. hirsuta*, and Java, home of *D. stylosa*, clearly shows these are conspecific, closely resembling the horticulturally propagated type of *D. villosa*, with the petal lobes spatulate, retuse and basally provided with downwardly directed linear auricles. The Indonesian material is marked, although inconstantly, by glabrous sepals and stiff erect hairs, i. e. they are truly hirsute as contrasted with the predominantly villose Mexican specimens. I have seen no specimens representing this species from the West Indies and believe that the epithet *cubensis* stems from some error in transposition of labels.

Forms comparable to *D. tepicana* M. E. Jones are not infrequent. In these, the petals are reduced to mere vestiges or are completely absent, and the seeds are often fewer in a capsule than is typical, but I am strongly inclined to doubt that these forms warrant even formal recognition. It may be here appropriately mentioned that similar reductions in the petals occur in the closely related species *Drymaria palustris* Cham. & Schlecht., and such variants have been described as *Drymaria townsendii* Robinson.

Standley and Steyermark (in Field Mus. Bot. 24^4:232. 1946) list *poleo, millón* and *llovizna blanca* as Guatemalan names for this species.

2. DRYMARIA CORDATA (L.) Willd. ex Roem. & Schult. Syst. Veg. 5:406. 1819.

Holosteum cordatum L. Sp. Pl. 88. 1753.
Holosteum diandrum Sw. Prodr. 27. 1788.
Drymaria diandra (Sw.) Macfadyen Fl. Jam. 1:52. 1837. non Blume, 1825.
Drymaria cordata β diandra (Sw.) Griseb. Fl. Brit. W. Ind. 56. 1859.
Drymaria cordata β puberula Tr. & Planch. in Ann. Sci. Nat. 4^{17}:148. 1862.
Drymaria procumbens N. E. Rose, in Contr. U. S. Nat. Herb. 1:304. 1895.
Drymaria adenophora Urban, in Fedde, Repert. Sp. Nov. 21:213. 1925.
Drymaria cordata var. *pacifica* Mizushima, in Jour. Jap. Bot. 32:78. 1957.

Glandular-puberulent to glabrate ramifying annuals, prostrate and spreading or erect, the internodes mostly longer than the nodes, glabrous to densely glandular, often rooting at the nodes. Leaves glabrous to scantily pubescent, orbiculate to reniform, apically rounded and occasionally mucronulate, basally rounded to cordate, 5–25 mm. long, 5–30 mm. broad, the petioles 2–15 mm. long; stipules mostly polylacerate, rather persistent, to 2 mm. long. Inflorescences of terminal or axillary few–many-flowered dichasial cymes (flowers rarely solitary in the axils), the bracteate pedicels locally girdled with a dense band of glandular pubescence, rarely subglabrous, 2–15 mm. long, equaling to much exceeding the subtending bracts. Sepals 5, lanceolate to ovate, acute, glandular-puberulent to glabrous, obscurely to strongly 3-nerved, 2.5–4 mm. long, the borders translucent; petals 5, 2–3 mm. long, deeply bifid, the lobes linear, acute, rarely obtuse, 1-nerved, basally exauriculate but rarely subdentate; stamens 2–3 (–5), the flattened filaments 2–2.5 mm. long, the anthers suborbicular, 0.2–0.3 mm. long; styles 3, free nearly to their bases or united for half their length, 0.5–1 mm. long; ovules few to many, campylotropous on free central placentae. Capsule ovoid, 1.5–2.5 mm. long, the 3 valves entire; seeds 1–12, 1.0–1.5 mm. broad, cochleate, dark reddish brown, tuberculate in lines, all the tubercles low and domical, closely approximated or contiguous.

A nearly pantropical species, in America ranging from Florida and Mexico through the West Indies and Central America along both coasts of South America to Argentina.

BOCAS DEL TORO: vicinity of Chiriquí Lagoon, *von Wedel 1249A*. CANAL ZONE: Chagres, Isthmus of Panamá, *Fendler 9*.

Fendler 9 was cited in the original description of *D. cordata β puberula* Tr. & Planch. but differs little, if any, from typical *cordata*. Mizushima (in Jour. Jap.

Bot. 32:69. 1957), studying the varietal potentials of this polymorphic species, described var. *pacifica,* which differs from typical *cordata* in having glabrous sepals, more seeds, and a tendency to have a greater number of stamens and the styles divided completely to the ovary. This rather striking variety seems to be lacking in continental North America. Occurring in both var. *pacifica* and var. *puberula,* for those who wish to recognize them, are variants in which the flowers are subsolitary in the axils. Surprisingly and fittingly these have as yet received no taxonomic status. *Drymaria adenophora* Urban represents a form with diminutive leaves and flowers and apparently is to be expected throughout the range of the species.

Mizushima resurrected *D. diandra* Blume from a long submergence in the synonymy of *D. cordata. D. diandra* seems to be confined to the Old World and differs in having pyriform flowers with the outer sepals strongly carinate and three-ribbed, the ribs interconnected. The petal lobes are broader and more obtuse and the seeds tend to be fewer and larger than in *D. cordata.*

Among the many colloquial Central American names for this species reported by Standley and Steyermark (in Field Mus. Bot. 24^4:228. 1946) are *palitaria* or *pelitaria, petatillo, comida de canario, trencilla, comapa, compona* and *nervillo.* Because of its lush mat-forming properties, the plant is often cultivated as a ground cover. According to Dickson (in Tea Quarterly 18:84. 1960) however, the beneficial effects are nullified after a few years, the plant becoming so aggressive as to notably reduce the yield of a tea plantation.

5. POLYCARPAEA Lam.

Polycarpaea Lam. in Jour. Hist. Nat. Paris 2:8. *t. 25.* 1792. *Nomen conservandum.*

Anthyllis Adans. Fam. 2:271. 1763. In part.
Polia Lour. Fl. Cochinch. 164. 1790. *Nomen rejiciendum.*
Policarpaea Lam. in Jour. Hist. Nat. Paris 2:1. 1792.
Polycarpoea Lam. loc. cit. 25. 1792.
Hagaea Vent. Tabl. 3:240. 1799.
Hagea Pers. Syn. 1:262. 1805.
Mollia Willd. Hort. Berol. 11. *t. 11.* 1806.
Lahaya Roem. & Schult. Syst. 5:402. 1819.
Aylmeria Mart. in Nov. Act. Nat. Cur. 13:276. 1826.
Hyala L'Herit ex DC. Prodr. 3:375. 1828.
Polycarpia Webb, ex Berthel. Hist. Nat. Isles Canary 3^2:156. 1836–50.
Planchonia J. Gay, ex Benth. & Hook. f. Gen. 1:154. 1862.
Robbairea Boiss. Fl. Orient. 1:735. 1867.
Polycarpea Pomel, Nouv. Mat. Fl. Atl. 202. 1874.
Polycarpus O. Ktze. in Post, & O. Ktze. Lexicon 453. 1904. In part.

Annual or perennial, usually pubescent, erect or prostrate herbs. Leaves opposite or verticillate, usually linear and sessile at the swollen nodes, with conspicuous scarious stipules. Flowers in terminal dichasial cymes, white or reddish. Sepals 4–5, occasionally biseriate. Petals 4–5, shorter than the sepals, entire or toothed. Stamens 4–5, the anthers versatile, the flattened hypogynous filaments

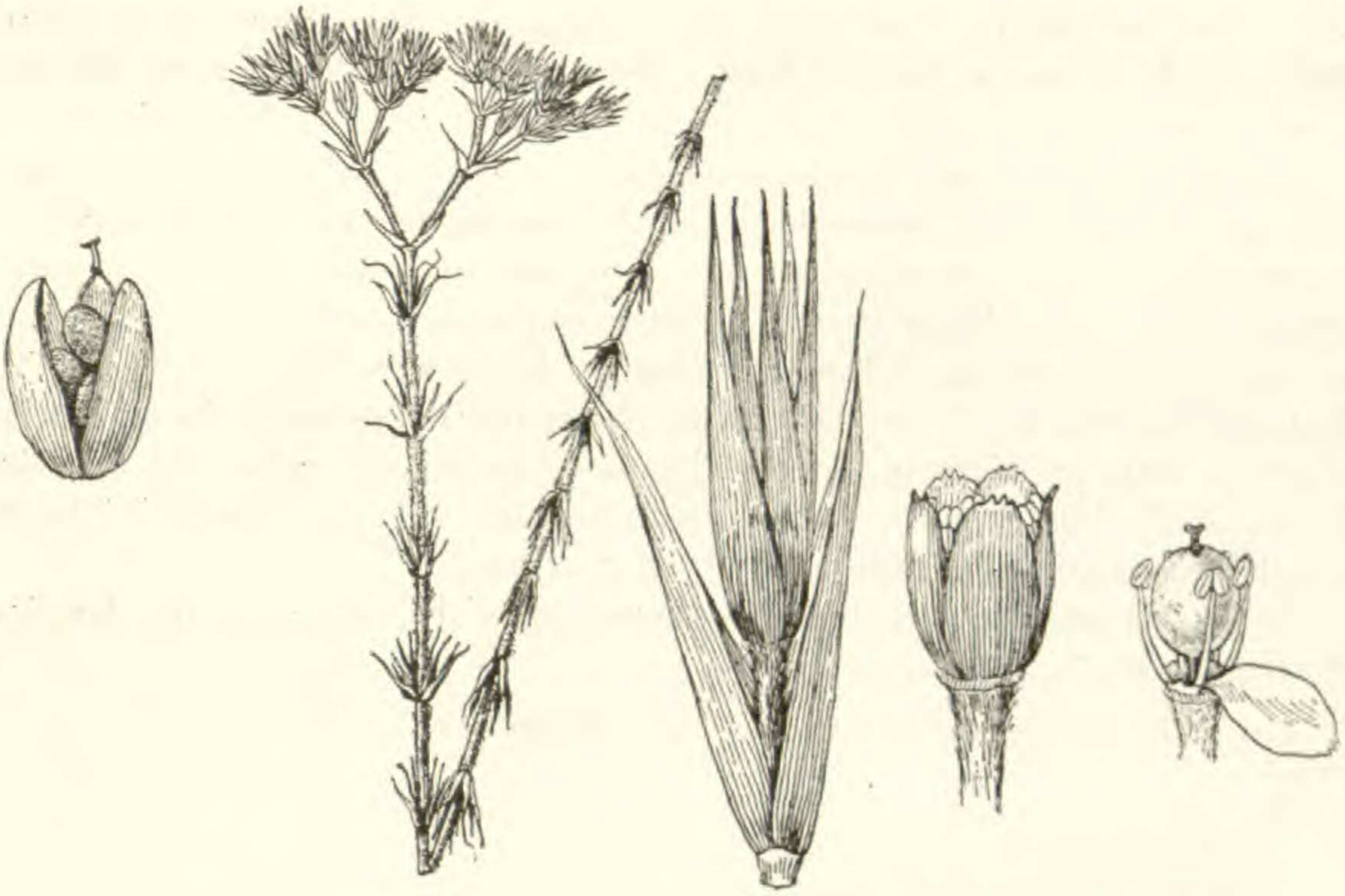

Fig. 141. *Polycarpaea corymbosa*

slightly connate below. Ovary superior, unilocular, carpels usually 3; styles united below, the stigmata subcapitate; ovules few, campylotropous on basal placentae. Capsule ovoid to ellipsoid, dehiscing longitudinally into 2–3 entire valves; seeds 1–few, cochleate, tuberculate, the embryo curved about the perisperm.

Primarily a tropical genus of some thirty species, with only one American species reaching as far north as Panama.

1. POLYCARPAEA CORYMBOSA (L.) Lam. Illustr. Gen. 2:129. 1793.

Achyranthes corymbosa L. Sp. Pl. 205. 1753.
Polycarpaea spadicea Lam. Illustr. Gen. 2:129. 1793.
Polycarpaea indica Lam. Encycl. 5:483. 1804.
Mollia spadicea Willd. Hort. Berol. 11. 1816.
Lahaya corymbosa Roem. & Schult. Syst. 5:404. 1819.
Polycarpaea densiflora Wall. Cat. *n. 1513*. 1828.
Polycarpaea brasilensis Camb. in St. Hilaire, Fl. Bras. 2:132. 1829.
Polycarpaea brasilensis var. *β ramosissima* Camb. in St. Hilaire, loc. cit. 2:132. 1829.
Polycarpaea subulata Wight, & Arn. Prodr. 358. 1834.
Polycarpaea atherophora Steud. in Flora *26*:763. 1843.
Polycarpaea brevifolia Muell. in Rep. Babb. Exped. *9*. 1858.
Polycarpa corymbosa O. Ktze. Rev. Gen. 1:51. 1891.
Polycarpa brevifolia O. Ktze. loc. cit. 1:51. 1891.
Polycarpaea filifolia Muschl. in Bot. Jahrb. 45:453. 1911.
Polycarpaea corymbosa var. *typica* Domin, in Biblioth. Bot. Heft 89^2:655. 1925.
Polycarpaea corymbosa var. *brevifolia* Domin, loc. cit. 89^2:655. 1925.

Herbaceous, argentate-pubescent, erect virgate or tufted annuals or perennials to 1 m. high. Leaves verticillate, linear, aristate, 3–15 mm. long, mostly less than 1 mm. broad, villous or glabrate, the aristate, often lacerate, argentate stipules 2–5 mm. long. Flowers many in congested dichasial cymes, the puberulent pedicels 2–5 mm. long, mostly exceeded by the subtending bracts. Sepals usually 5, occasionally biseriate, lanceolate to ovate, attenuate to aristate, argentate or rarely rufous, often with a darker triangle at the base, 2–4 mm. long; petals 5, obovate, apically undulate, drying yellowish or brown, 0.5–1 mm. long; stamens 5, the flattened filaments 0.5–1 mm. long; ovary short-stipitate, obovoid, the style 0.25–0.50 mm. long, the stigmata minute. Capsule ellipsoid, 1–2.5 mm. long, dehiscing longitudinally into 3 entire valves; seeds 2–6, ca. 0.5 mm. broad, cochleate, minutely corrugated, light brown, on basal placentae.

Usually in arenaceous savannas, cosmopolitan in the tropics, in the Americas reaching its northern limits in Panama.

COCLÉ: in savannas near sea level, Aguadulce, *Pittier 4953*.